ECNS 432
Ch 15

Contingent Valuation Methods

- General approach to all CV methods
  - 1st: Identify sample of respondents from the population w/ standing
  - 2nd: Respondents are asked questions about their valuations of some good
  - 3rd: Responses provide information that allows analysts to estimate WTP for the good
  - 4th: The WTP amounts for the sample are extrapolated to entire population
- Several methods for eliciting WTP, we are going to cover one method that some believe is the best choice in many circumstances

Dichotomous Choice Method (aka Referendum Method)

- Respondents are asked whether they would be WTP a particular price to obtain a good or policy
- Each respondent receives one randomly drawn price
  - The respondent is asked to state whether they would be WTP for the good or policy at the offered price
    - 1 = yes, 0 = no
- The dollar amounts (aka bid prices) are selected over a "reasonable" range selected by the analyst
- The probability of respondents accepting the offer can then be calculated for each bid price

[insert curve fitted to histogram of responses]

Dichotomous Choice Method (aka Referendum Method)

- Fitted curve may be viewed as the demand curve of a randomly drawn (i.e. average) member of the sample, while the histogram may be viewed as a rough approximation of this demand curve.
  - Different from a standard demand curve
    - Instead of indicating the quantity of a good the individual would be willing to purchase at each price, it indicates the probability the individual would be WTP for the specified outcome at each price
  - As w/ the standard demand curve, area under this curve provides an estimate of the individual's total WTP.

Dichotomous Choice Method (aka Referendum Method)

- If values of X are evenly spread, then the histogram can be used to obtain a rough estimate of the average individual's WTP by applying the simple formula:

$$\text{WTP} = v\sum_{k=0}^{N}[Probability\ of\ acceptance\ at\ price\ kv]$$

  where v is the interval between prices and N is the number of values of X

- i.e. Approx. WTP can be computed by simply summing the heights of the bars and multiplying by bar width

  [hand out example of this method used in practice. Write up econometric specification]

Problems with CV (list is long!)

- Sample and nonresponse bias
  - Q. Some examples?
  - Q. Why might this be a problem?
  - Q. How would we try to mitigate this?
- Strategic response bias
  - Respondents trying to achieve some desired outcome
    - Examples?
  - Problem when people do not have to actually pay (type of "noncommitment bias"
- Anchoring bias
  - "This product must be valuable b/c they are asking me about it and describing it in such detail"
- WTP vs. WTA

WTP vs. WTA

- Economic theory implies that if individuals behave rationally, and if markets work efficiently, then in most situations it shouldn't matter whether respondents to a CV survey are asked their WTP for receiving a good or their WTA the loss of a comparable good.

- Similarly, should not matter if they are asked their WTP to prevent a loss or their WTA for a comparable loss

- But, evidence suggests that individuals demand greater monetary compensation to give up things they already possess than they ware WTP to acquire the same exact item.

  - In experiments, it has been found that WTA often exceeds WTP

WTP vs. WTA

- Other evidence suggests that for nonmarket goods with imperfect substitutes the difference between WTP and WTA can become quite large

- Hanemann (1991)
  - Holding income effects constant, the smaller the substitution effect (i.e. the fewer substitutes available for the public good) the greater the disparity between WTP and WTA
  - If private goods are readily substitutable for the public good, there ought to be little difference between an individual's WTP and WTA for a change in the public good.
  - However, if the public good has almost no substitutes (e.g. Yosemite NP, or in a different context, your own life), there is no reason why WTP and WTA could not differ vastly
    - In the limit, WTP could equal the individual's entire (finite) income, while WTA could be infinite.

WTP vs. WTA

[insert theoretical treatment of this issue]

WTP vs. WTA

- WTP vs. WTA: What should we use in practice?
- Some have argued that stated preferences are preferences and that, if respondents are actually being asked to give up something, then the relevant formulation is WTA
  - Still have issues involving judgment and response bias the analyst needs to take into account
- Experimentally, WTP amounts are much closer to estimates derived from revealed preference methods…so, the usual procedure is to use WTP estimates instead of WTA.

- There is also evidence that the differences between WTP and WTA may also be due to *loss aversion…*which we will return to shortly
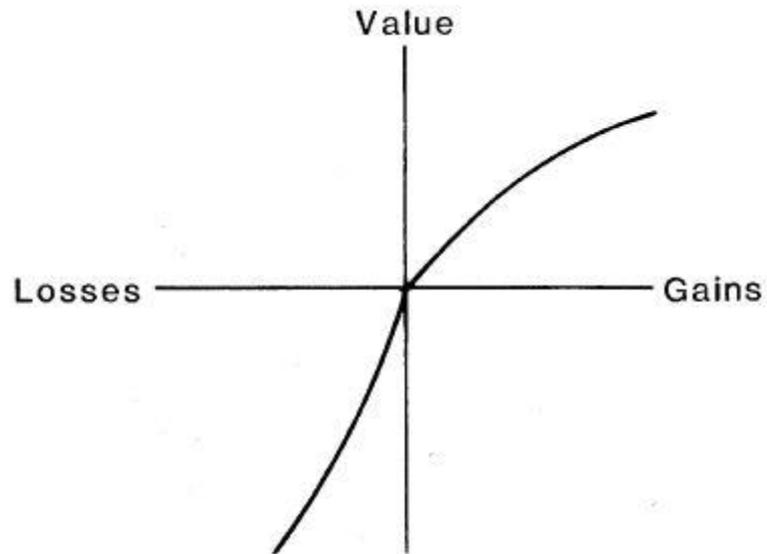
Prospect Theory

- In certain circumstances, people may not appear to be maximizing their expected utility (i.e. they appear to not behave rationally)
  - May occur in context of CV surveys
    - Judgment rather than decision making is involved
    - Not opportunities to learn from mistakes
    - Especially when uncertainty is involved
- Violations of expected utility hypothesis can be explained by the fact that, when dealing with complex information, people tend to use simplifying (nonutility-maximizing) "rules of thumb."
- One conceptual framework for explaining violations of the expected utility hypothesis is *prospect theory*

Prospect Theory

- Particularly relevant to CV
- Suggest people deviate from expected utility maximization in several ways
  - They value gains and losses from a reference point rather than valuing net wealth
  - People tend to strongly prefer avoiding losses to acquiring gains (aka *loss aversion*)
    - People are risk averse when evaluating a possible gain (aka risk aversion)
    - People strongly prefer risks that might mitigate a loss (aka risk seeking)
    - A loss and a gain of the same size would leave a person who is loss averse worse off.
    - May stem from an *endowment effect*, where people have a greater psychological attachment to things they currently possess.

Prospect Theory

- Several of the effects can be summarized by a prospect theory value function

Prospect Theory

- Most behavior predicted by prospect theory and consistent with loss aversion has been found in lab settings

- Critics of prospect theory believe these biases are likely to be extinguished by competition, large stakes, and experience

> "Perhaps the greatest challenge facing behavioral economics is demonstrating its applicability in the real world. In nearly every instance, the strongest empirical evidence in favor of behavioral anomalies emerges from the lab. Yet, there are reasons to suspect that these laboratory findings might fail to generalize to real markets."
>
> Levitt and List (2008)

Prospect Theory in the Field

- Pope and Schweitzer (2011) examine field evidence of loss aversion by considering a market with high stakes and experienced agents: PGA Tour

- Q. Why is golf an ideal setting for studying loss aversion?
  - Golfers should care only about their overall tournament score
  - But, they may be influenced by the salient, but normatively irrelevant, reference point of par when they attempt putts

  [insert diagram in context of golf]

Prospect Theory in the Field

- E.g. the difference in value between scoring a birdie and a par on a hole is smaller than the difference in value between scoring a par and a bogey.

- Predictions
  - Putts attempted for par, bogey, and double bogey will be more accurate than putts attempted for birdie and eagle
  - Probability of making birdie putt is greater than probability of making eagle putt and so on.

Prospect Theory in the Field

- Q. Why is this difficult to figure out within context of putting in golf?
  - Characteristics of putts differ greatly
    - E.g. eagle putts are generally further from the cup than birdie putts
    - They control for a host of putt-level characteristics
      - Distance
      - Prior putts on green
      - Hole position on green
      - Golfer's standing in the tournament at time of putt
      - Golfer characteristics

Prospect Theory in the Field

- Results
  - They demonstrate that loss aversion continues to persist in a highly competitive market
    - Golfers hit birdie putts less accurately than they hit otherwise similar par putts
  - Loss aversion is moderated by round
    - As tournament progresses, the accuracy gap between par and birdie putts diminishes but is not extinguished.
      - Implies the accuracy gap derives from a psychological rather than a mechanical process
  - In sum, although pro golfers should strive to hit each putt as accurately as possible, they do not.
- Back to CV…WTP vs. WTA matters!

Single-Site Travel Cost Model

- Alternative way to measure demand for a nonmarket good.
  - Most often used to value environmental amenities
- Based on the simple intuition that, if a consumer is willing to spend some amount to travel to a recreation site, then the consumer would be at least WTP this amount as a price for access to the site.

[insert simple theoretical model]

Single-Site Travel Cost Model

- In practice, the single-site travel cost model is estimated as

$$Trips_i = \alpha + \beta TravelCost_i + X_i \delta + \varepsilon_i$$

- What are difficulties in this approach?
  - Constructing Travel Cost variable is not easy
  - Issue of substitute sites is not easy to deal with
  - Sampling is often very difficult
    - On-site sampling
    - Email surveys
  - Could travel cost be endogenously determined?
    - How would this bias estimates?

Random Utility Travel Cost Model

- The random utility model (RUM) considers a person's choice of a site for a recreation trip
  - Does a better job of capturing site substitutes and valuing quality changes than the single-site model
- Instead of a "quantity demanded" as in the single-site model, there is a site chosen
- In choosing a site a person is assumed to consider its "price" (i.e., trip cost) and its characteristics (e.g., ease of access or environmental quality)

[insert RUM theory]

Random Utility Travel Cost Model

- We are obviously not going to cover the econometric techniques used to estimate the RUM, but what are going to be some practical difficulties?

- In particular, what is going to be a difficulty with this method above and beyond estimating the single-site method?

- Ans. Defining the choice set is of the utmost importance

- Examples
  - Parsons and Kealy (1992) analyzed lake recreation in WI
    - Lakes over 100 acres large are defined as the sites; there are over 1,000 such lakes in WI
    - They limited it to lakes within 150 miles of the individual's home residence
    - Few people in the data set traveled further than this for lake recreation

Random Utility Travel Cost Model

- Andrews (1996) analyzed trout fishing in eastern PA
  - Over 2,000 stream segments and lakes known to have trout
  - Limited it to waters within 185 miles of a person's home
  - The furthest anyone in the data set traveled was 183 miles
- Shaw and Jakus (1996) studied rock climbing in the northeastern US
  - Their sites are defined as the four major climbing areas in the region
- Some concern over using researcher- vs. individual-defined choice sets
  - Q. Can people perceive a thousand sites when making a decision?
  - Some have allowed the individuals to define their own choice sets in surveys…but this comes with the tradeoff of asking more time from the respondent

More on estimating travel costs

- Travel time costs
  - For individuals whose work time is variable, the opportunity cost should be measured as income forgone.
  - Do most individuals fall under this category?
  - No, most people are constrained by a fixed workweek and receive paid vacation days.
  - Individuals who travel and recreate during weekends and vacations when no working time is lost incur only leisure time costs
    - This value may range between zero and the individual's wage rate.
    - Leisure time costs are zero if individuals would not have engaged in any other leisure activity had they not taken the trip.
    - Leisure time costs would equal the individual's wage rate if the alternative leisure activity were valuable enough to forego earnings, given the opportunity.
  - Both travel and on-site time costs can be added to direct travel costs to determine the total or full price of a recreation visit
  - Including time costs has improved estimates of the price of outdoor recreation
    - Exclusion of the opportunity cost of time introduced a bias resulting in the underestimation of the price and value of outdoor recreation.

More on estimating travel costs

- On-Site Costs
  - On-site costs are the added expenditures the consumer must incur to allow them to stay at the recreation site.
  - Some of these may have been paid prior to the trip, such as prepaid hotel reservations.
    - These costs would not have been incurred had the trip to the site not been undertaken
    - Any food costs over and above what would have been consumed at home had the trip not been undertaken would usually be considered on-site costs as well.
  - Once travel costs have been incurred for getting to a site, some individual users may consider them as sunk, and their decision about how long to stay may depend solely upon the on-site costs of an additional day.
    - However, most recreation trips are preplanned, and the length of stay is constrained by available leisure time
  - Generally, the relevant concept of price includes all out-of-pocked costs of the trip combined into a single variable

More on estimating travel costs

- Fixed Costs
  - Fixed costs are the costs of consumer investment in durable recreation equipment and annual costs such as licenses over the period of use
    - (1) costs of investments in durable recreation equipment such as boats, fishing gear, skis, special clothing, tents, camping gear, sporting equipment, binoculars, cameras, and seasonal homes
    - (2) annul costs of fishing, hunting, and other licenses, insurance, and taxes that are the same regardless of the number of recreation trips
  - These costs are applicable to consumer decisions to being participating in a recreation activity, where the purchase of durable equipment is often necessary in order to participate at all.
  - It is also applicable to consumer decisions to continue participating in a recreation activity on those infrequent occasions when equipment owned wears out or becomes obsolete and decision becomes either to replace it with new or used equipment in order to continue participating.
  - However, it is important to remember that the concept of fixed cost is not applicable to consumer decisions that take place on the margin (i.e., the decision to take an additional trip to a recreation site.
    - Thus, it would be unrealistic to consider fixed costs as part of the direct costs or price of outdoor recreation