What Should Benefit-Cost Analysis Tell Us?

Maureen L. Cropper
RFF and University of Maryland

June 23, 2009
What Does Benefit-Cost Analysis Tell Us?

- What people *think* would make them better off ("Positive"—or descriptive—approach)
- What *would* make people better off; What they *should prefer* ("Normative" Approach)
- To what use should BCA be put?
  - Should it inform decision makers?
  - Dictate regulatory outcomes?
  - Inform the public?
What Should Benefit-Cost Analysis Tell Us?

- It should identify efficient (and inefficient) policies, assuming people are well informed about objectively measured risks.

- It should not be the sole criterion for making a regulatory decision; equity and distributive considerations matter.

- It should help us identify when we need to make equity-efficiency trade-offs.
Implications for Conducting BCAs of Health & Safety Regulations

- BCAs should be conducted using the damage function approach:
  - Risk assessment should be separated from valuation and appropriate endpoints valued

- Valuation methods should demonstrate that people understand what they are valuing

- The distribution of benefits across members of society should be clearly documented
  - But not necessarily valued in dollar terms
Benefit-Cost Analysis via the Damage Function Approach

- Impacts of regulations on health endpoints estimated (objectively) by risk assessors
- Unit values applied to health endpoints (premature mortality, cancer cases avoided)
  - Economists attempt to measure what people would pay for changes in health risks
  - Lower-bound estimates (cost of illness; earnings losses) sometimes used
- Approach is “normative” in JKH’s terminology
  - We are measuring benefits associated with objectively measured risks – not people’s risk perceptions
  - Not normative in the sense that this determines the regulatory outcome
The Damage Function Approach – Case of Air Toxics

- The National Scale Air Toxics Assessment (NATA) database
  - Estimates the impact of emissions of 177 toxic air pollutants on ambient air pollution levels
  - Calculates effects on population exposures at census block group level
  - Estimates lifetime cancer risk for 87 HAPS
  - Damage function approach would value changes in cancer risks using stated or revealed preference studies
Important Facts About Hazardous Air Pollutants (HAPS)

- Lifetime cancer risks are generally small:
  - 95th percentile of lifetime cancer risk (measured at Census tract level) is $\approx 2 \times 10^{-4}$

- Distribution of cancer risks is uneven:
  - Map on next page shows lifetime cancer risk at the county level based on 1999 NATA database
  - Concern that low-income groups, minorities are more highly exposed to HAPS
What Can BCA Tell Us About Regulations to Control HAPS?

- Combine objectively measured risk reductions with studies that value cancer risks
- Good studies capture the dreadedness of the disease, side-effects of treatment and morbidity that precedes death
- Suggests a preference for stated preference studies
- Could use revealed preference studies where it is clear that cancer endpoint is valued (e.g., Davis AER (2004))
- What is BCA alternative to this approach?
  - Could use impact of emissions reductions on property values
Benefits of Benzene Reductions in Houston

- Section 812 Benzene case study (IEC, 2008) an excellent example of a careful study
  - Examines benefits of reducing benzene exposure from all applicable titles of the 1990 CAAA
  - Does not examine costs
- Predicted reduction in leukemia cases:
  - 7 fatal and 6 non-fatal cases over 1990-2020 period
- NPV of cancer benefits from benzene reductions in Houston, 1990-2020 ≈ $30 Million (2006 USD)
- Suggests a situation where may have to trade equity for efficiency
How to Deal with Equity Issues?

- Could elicit willingness to pay to reduce cancer risks to others
  - Assuming people are paternalistic altruists, may want to allow these values in a BCA

- BCA can be supplemented by information on the distribution of risks across the population (e.g., using an Atkinson Index)

- Should be careful what is monetized in a BCA
  - Don’t ask people to value a scale-independent equity measure
Conclusions

- **What a BCA Should Do:**
  - It should identify efficient (and inefficient) policies, *assuming people are well informed about objectively measured risks*.
  - It should supplement aggregate benefits and costs with measures of their distribution in the population.

- **What a BCA Should Not Do:**
  - Use revealed preference studies unless it can be demonstrated that people accurately perceived associated health effects.
  - Monetize equity measures—although equity considerations should be considered in decision making.