

Cost-Benefit Analysis and Decision Tools (ESM 245)
Bren School of Environmental Science & Management
University of California, Santa Barbara
Fall 2017
August 20, 2017

Professor: Gary Libecap
Office: 4412 Bren Hall
Phone: 520-444-1695
Email: glibecap@bren.ucsb.edu
Class meetings: T & Th 9:30-10:45 1424 Bren Hall
Office hours: T11-12 or by appointment
TA: Dan Szmurlo: daniel02@umail.ucsb.edu

Course Objectives and Rationale

Cost-benefit analysis provides a framework for conducting economic analysis of public policy, as well as examining tradeoffs in decision making within organizations—firms, NGO, government agencies. The application of cost-benefit analysis to environmental and natural resource policy is both common and controversial. This is a course in evaluation of tradeoffs encountered in assessing options for government, NGOs, and private firms. Cost-benefit analysis and feasibility studies are key tools.

Decisions within organizations and government regarding environmental issues always involve tradeoffs. To accurately assess these tradeoffs, costs and benefits have to be measured; relevant parties determined; timelines decided; and discount rates selected. Anyone can create a benefit/cost ratio or calculate NPV. The issue is whether or not they are credible and useful. Accordingly, the course will be more than a practical exercise in cost benefit analysis.

It will cover the underlying theory of social decision-making based on a comparison of economic costs and benefits, as well as cover more focused application within organizational units. We will consider numerous applications in the context of environmental and natural resource management, and have as many presentations of application from the Group Projects as possible. We also will read the literature on key issues in cost-benefit analysis. In many cases, as we will see, cost-benefit analysis requires an understanding of methods of nonmarket valuation, selection of appropriate discount rates, addressing uncertainty in the flow of costs and benefits, and issues of their distribution since they rarely are distributed uniformly in the society. Hence we will spend time covering the theory of nonmarket values and the methods for estimation in the context of environmental and natural resources; assessment of discounting options; weighting of costs and benefits; consideration of uncertainty; and distributional implications. Some of this material will overlap with what you have already covered in other MESM courses, but given the difficulty of nonmarket valuation and the problems of distribution of costs and benefits in program acceptance and durability, this is a good overlap.

Students will learn the skills necessary to conduct original cost-benefit analyses and feasibility studies and to evaluate those conducted by others. Additionally, students will gain an appreciation for the potential advantages and disadvantages of cost-benefit analysis, along with its relation to other approaches for decision-making about environmental and natural resource concerns.

Students will apply this learning to Group Projects represented in class.

All students **MUST DO THE READINGS PRIOR TO CLASS.**

Approach and Grading

Given the large class size, students will divide into GP teams of 6. **Each team will conduct a cost benefit analysis for the Group Project.** For some, this will be their GP, but for others this will be practice in applying cost benefit analysis because not all GPs represented can be accommodated in light of the class size.

Grading will be based on a). 15% class discussion of course material and comprehension of material as applied to the GP. b). 15% critiques of the CBA analyses of other GPs. c). 30% problem set grades. and d). 40% final CBA for the Group Project due at the end of the term to include details on approach, problems encountered, caveats, references, and technical appendix, if appropriate.

Students will be graded individually on the 5 CBA problems assigned separately in class and on class participation. Other grades will be group grades for the GP.

Course Materials

Required text is *Cost Benefit Analysis and the Environment: Recent Developments* by David Pearce, Giles Atkinson, and Susana Mourato, OECD, 2006. It is available on the web at <http://www.oecd-ilibrary.org/content/book/9789264010055-en> and UCSB has a subscription to OECD publications so that students can download chapters. There will be other cases and readings that will be posted on the web.

Other course materials for the project will be posted on Gauchospace.

Course Requirements

All problem sets and team assignments will be due **the day prior at 8 am. Presenting teams will take 10 minutes, followed by 10 minutes of class discussion.**

Course Outline and Reading List

September 28: Course Overview, Economic Concepts.

- Course overview. Present syllabus.

- **GP teams due to Dan by October 3.** 6 members each. GPs will be formed by students.
- Review of microeconomic principles for environmental management. Efficiency criterion and what that means.
- **READING:** Shively and Galopin, “An Overview of Benefit-Cost Analysis,” Purdue University mimeo. **Be sure to go over this carefully for the class discussion.**
- Supplemental: Pearce, et al, 2006, Chapters 1, 2.

October 3: CBA Concepts

- Introduction to discounting, distribution of costs and benefits, impact of shifting costs to benefits, scale effects, differences in time frame across options.
- Discussion of: Benefit-Cost Ratios, Cost Minimization, Net Present Value Analysis, Internal Rate of Return, Equivalent Annual Net Benefits.
- Team announcements.
- **READING:** Cost Benefit Analysis, “Evaluating Quantitatively Whether to Follow a Course of Action.”
- Team announcements.

October 5: Cost Analysis

- **READING:** Pearce, et al, 2006, Chapters 3-5.
- Direct and indirect costs and their importance in CBA because they affect the DISTRIBUTION OF BENEFITS AND COSTS. Not all “public goods” are received equally or valued equally nor are costs and benefits distributed uniformly. These distributional issues play a major role in support or opposition to environmental programs.
- Discussion of GP costs.
- Problem set # 1 introduction: Evaluation of transportation improvement options for Houston: Buses or Light Rail. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Tuesday October 10 and be prepared to lead discussion.**

October 10: Distributional Issues in CBA.

- Class discussion of CBA of the re-introduction of wolves in the northern Rockies, including distributional impacts. Distribution and the Reintroduction of the Wolf
- **READING:** Who Pays for Wolves? Fischer (2001).
- Supplemental: 8 Pros and Cons of Wolf Introduction.
- Supplemental: Smith and Sime, Policy Issues Related to Wolves.
- Supplemental: Costs of Wolf Reintroduction.
- Discussion of Houston transport problem led by Dan Szmurlo and selected students.
- GP teams self-select presentations for 10/12, 10/17. See Gauchospace for sign-ups. Presentation PPTs and write-ups due 8 am each day.

October 12: First Cost Measurement GP Team Presentations.

- 5 presentations, 12 minutes each that include Q&A. Everyone comments.

October 17: Second Cost Measurement GP Team Presentations.

- 5 presentations, 12 minutes each that include Q&A. Everyone comments.
- Problem set #2 introduction: Distribution of Costs and Benefits Problem: RECLAIM. Be prepared also to discuss why distributional issues are important in CBA. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday October 19 and be prepared to lead discussion.**

October 19: Distributional Issues in CBA continued.

- **READING:** Meredith Fowlie et al (2012). "[What Do Emissions Markets Deliver and to Whom? Evidence from Southern California's NOx Trading Program](#)," *American Economic Review*. 102(2): 965–993.
- Supplemental: Lueck and Michael (2003) "Pre-emptive Habitat Destruction under ESA" *Journal of Law and Economics*" 46: 27-60.
- Supplemental: Spencer Banzhaf (2009). "The Political Economy of Environmental Justice" RFF.
- Discussion of Problem set #2, RECLAIM and its distributional impacts, environmental justice.

October 24: Benefit Measurement: *Revealed Preference*

- Various means of determining value from **revealed preference**.
- **READING:** Schmidt and Courant (2006) "Sometimes Close is Good Enough: The Value of Nearby Environmental Amenities," *Journal of Regional Science*. 46(5): 931-51.
- Supplemental: Pearce et al Chapter 6, 7.
- Averting Behavior
- Supplemental: Abdalla et al (1992) Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination. *Land Economics* 68(2): 163-69.
- Introduction to Problem Set #3, Travel Cost and Hedonic Measures of Benefits. Ecosystem Services in Prairie Restoration. **Problem set answer due October 26 by 8am to Gary/Dan and be prepared to lead discussion.**

October 26: Benefit Measurement: *Revealed Preference:*

- Dan Szmurlo leads:
- Travel Cost Estimates
- **READING:** Tobias and Mendelsohn (1991), "Valuing Eco Tourism in a Tropical Rain-Forest Reserve," *Ambio*
- Discussion of Problem Set #3, Value of Ecosystem Services: Prairie Restoration.

October 31 (Halloween). *Revealed Preference Hedonic Pricing*

- Dan Szmurlo leads:
- Hedonic Prices—property valuation, Examples of Hedonic Pricing Calculations.
- READING: Coulson Hedonic Pricing discussion file.
- Supplemental: Harrison and Rubinfeld.
- Introduction to Problem set #4, Santa Barbara’s Desalination Plant. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday November 2 and be prepared to lead discussion.**

November 2: Benefit Measurement Continued.

- Alternative Approach to Benefit Measurement: What benefit would have to equal calculated costs?
- READING: Kotchen and Burger (2007) “Should we Drill in the Arctic National Wildlife Refuge? An Economic Perspective,” *Energy Policy*
- Discussion of Problem Set #4 Santa Barbara’s Desalination Plant.

November 7: Benefit Valuation Continued: *Stated Preference*

- Dan Szmurlo leads:
- Stated Preference, Contingent Valuation.
- READING: Kotchen and Reiling (2000) “Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species,” *Ecological Economics* 32: 93-107.
- Supplemental: Pearce, et al, Chapter 7, 8.
- Supplemental: Kotchen and Reiling Survey Instruments
- Discussion of survey instruments.

November 9: Benefit Calculation: *Stated Preference*.

- READING: John Loomis and Douglas Larson, (1994), “Total Economic Values of Increasing Gray Whale Populations; Results from a Contingent Valuation Survey of Visitors and Households,” *Marine Resource Economics* 9: 275-86.
- Supplemental: Whale, Fire Survey Instruments.
- Discussion of survey instruments, stated preference protocols.
- Supplemental: Catherine L. Kling, Daniel J. Phaneuf, and Jinhua Zhao (2012) “From Exxon to BP: Has Some Number Become Better than No Number?” *Journal of Economic Perspectives* 26(4): 3–26.
- Second round of GP presentations: Benefit measures, November 14, 16. Groups self-select which day to present. PPTs and write ups due 8 am of presentation day.

November 14: GP Benefit Presentations.

- 5 teams, 12 minutes each, including Q&A. All comment.

November 16: GP Benefit Presentations.

- 5 teams, 12 minutes each, including Q&A. All comment.

November 21: Benefit Measures: Health *Valuing Health and Life Risk*

- **READINGS:** W. Kip Viscusi (2008): "The Value of Life," The New Palgrave Dictionary of Economics.
- "Why the Government Puts a Dollar Value on Life" Wall Street Journal, March 25, 2016.
- Supplemental: Pearce et al, Chapter 14
- Class discussion of human valuation issues, Value of Statistical Life.
- More complicated than ecosystem services?
- Introduction to Problem Set# 5 (Occupational Fatalities and VSL)
- **Problem set write up due November 28, 8 am to Gary/Dan.**

Nov 23 Holiday

November 28: Benefit Measures: Health *Valuing Health and Life Risk*

- Value of Life Year.
- **READINGS:** James K. Hammitt (2007) "Valuing Changes in Mortality Risk; Lives Saved Versus Life Years Saved" REEP 1(2): 228-233 only.
- Discussion of Problem Set #5.
- Teams self-select for final presentations, November 30, Dec 3.

November 30: Third round of GP Presentations. Cost and Benefits.

- Team presentations, 12 minutes each including Q&A.

December 5: Third round of GP CBA Presentations. Costs and Benefits.

- Team presentations, 12 minutes each including Q&A.

December 7: 8 am: GP CBA analysis due. All research papers (10 pages with references for each project). Teams can submit earlier, this is the FINAL time for submission.

Date	How many readings?	What's due
9/28	2	
10/3	1	GP Teams to Dan
10/5	1	
10/10	4	PS1, Cost presentation time slots on Gauchospace
10/12	0	Cost Presentations
10/17	0	Cost Presentations
10/19	3	PS2
10/24	3	
10/26	1	PS3
10/31	2	
11/2	1	PS4
11/7	3	
11/9	4	Benefit Presentation time slots on Gauchospace
11/14	0	Benefit Presentations
11/16	0	Benefit Presentations
11/21	4	
11/28	1	PS5
11/30	0	Final Presentations
12/5	0	Final Presentations
12/7	-	Research paper due between 12/5 and 12/7