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| Cost-Benefit Analysis and Decision Tools (ESM 245)Bren School of Environmental Science & ManagementUniversity of California, Santa BarbaraFall 2016November 13, 2016Professor: Gary LibecapOffice: 4412 Bren HallPhone: 520-444-1695Email: glibecap@bren.ucsb.eduClass meetings: T & Th 8:30-9:45 1424 Bren HallOffice hours: T10-11 or by appointmentTA: 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 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. 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 a real project that has both private and public benefits and costs with implications for all aspects of environmental decision making. All group projects represented in the class will have a cost benefit analysis completed by the end of the term.**Approach and Grading**Students will divide into teams of 3-5. The objective is to have teams organized around **Group Projects. Each team will conduct a cost benefit analysis for the Group Project.** Grading will be based on a). class discussion of course material and comprehension of material as applied to the GP. b). critiques of the CBA analyses of other GPs and a 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 CBA problems assigned separately in class. Weights 50% times individual problem set grades and 50% times group presentation and final CBA submission.  **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. **Course Requirements**You are expected to complete all of the assigned reading before class, as lectures will build on, rather than reiterate, reading material. The aim is to have much of class based on discussion, so being prepared will be important. Classes generally will involve lectures, discussion of CBA problems, and student team presentations and critiques. All 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 22: *Course Overview, Economic Concepts, Problem Set 1*****Lecture 1.*** Course overview. Present syllabus.
* **GP teams due to Libecap by September 27.** 3-5 members. GP members with less than that should join another team.
* Review of microeconomic principles for environmental management. Efficiency criterion and what that means.
* 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 Thursday September 29 and be prepared to lead discussion.**
* Discussion for 9/27: How would you do a cost benefit analysis of dam removal? The case of Milltown dam, Montana.

**September 27: *What is Cost-Benefit Analysis (CBA) and Why is it Important?*** **Lecture 2*** Introduction to CBA. Matt Kotchen, “Cost-Benefit Analysis” *Encyclopedia of Climate and Weather,* 2nd Ed, Oxford University Press, 2010.
* Shively and Galopin, “An Overview of Benefit-Cost Analysis,’ Purdue University mimeo. **Be sure to go over this carefully for the class discussion**.
* Pearce, et al, 2006, Chapters 1, 2
* Team announcements.
* Class discussion of CBA for dam removal. **Milltown Dam**.

**September 29: *Problem Set 1: Houston’s Transport Problem*****Lecture 3** * Discussion of Houston transport problem led by Dan Szmurlo and selected students.
* Problem set #2 introduction. Analysis of American Solar’s planned expansion. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday October 6 and be prepared to lead discussion**

**October 4: *Introduction to Evaluation Tools*.** **Lecture 4*** Readings: Pearce, et al, 2006, Chapters 3-5.
* 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.
* Cost Benefit Analysis, “Evaluating Quantitatively Whether to Follow a Course of Action.” **Be sure to go over this short example carefully to understand the concepts prior to class**.
* Direct and indirect costs and their importance in CBA.
* CBA in a Economic Development/Environmental Context: “Simple Introduction to Cost-Benefit Analysis.” Howard. **Be sure to go over this real world example in Samoa prior to class.**

**October 6: Problem Set #2 American Solar’s Planned Expansion*.*** **Lecture 5.*** Discussion of American Solar’s planned expansion problem led by Dan Szmurlo and selected students.
* Problem set #3 introduction. Distribution of Costs and Benefits Problem. 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 13 and be prepared to lead discussion.**

**October 11: *Cost and Benefit Considerations: Concepts and Measurement and Distribution and its Importance.*** **Lecture 6.*** Readings: Pearce et al Chapter 6
* Segerson (2014) “Distribution and Compensation in Economics”
* Lueck and Michael (2003) “Pre-emptive Habitat Destruction under ESA” *Journal of Law and Economics”* 46: 27-60.
* Meredith Fowlie et al (2012). “[What Do Emissions Markets Deliver and to Whom? Evidence from Southern California’s NOx Trading Program](http://www.nber.org/papers/w15082),” *American Economic Review*.102(2): 965–993.
* Spencer Banzhaf (2009). “The Political Economy of Environmental Justice” RFF.
* Class discussion of CBA of the re-introduction of wolves in the northern Rockies, including distributional impacts. Distribution and the Reintroduction of the Wolf
* Who Pays for Wolves? Fischer (2001).
* 8 Pros and Cons of Wolf Introduction
* Smith and Sime, Policy Issues Related to Wolves
* Wolves in the Northern Rockies
* Costs of Wolf Reintroduction
* Wolves and People (Duffield, Neher, and Patterson, 2006).

**October 13: Problem Set 3: Distributional Issues in Cost Benefit Analysis. Discussion.****Lecture 7.*** Discussion of Distributional Issues in CBA led by Dan Szmurlo and selected students.
* Problem set #3 introduction. Distribution of Costs and Benefits Problem. Be prepared also to discuss why distributional issues are important in CBA.
* Introduction of problem set #4, CBA of Santa Barbara’s Desalinization plant. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday October 20 and be prepared to lead discussion.**

 **October 18: *Introduction to Benefit Valuation: Revealed Preference:*** **Lecture 8.*** Readings: Pearce et al Chapter 6, 7.
* Various means of determining value from **revealed preference**.
* Averting Behavior
* Schmidt and Courant (2006) “[Sometimes Close is Good Enough: The Value of Nearby Environmental Amenities](http://www2.bren.ucsb.edu/~kotchen/links/teaching/schmidt.pdf),” *Journal of Regional Science*.46(5): 931-51.
* Travel Cost Estimates
* Tobias and Mendelsohn (1991), “Valuing Eco Tourism in a Tropical Rain-Forest Reserve, *“Ambio*

**October 20: Problem Set #4: CBA of Santa Barbara’s Desalinization Plant.****Lecture 9.*** Discussion of CBA of Santa Barbara’s Desalinization Plant led by Dan Szmurlo and selected students.
* Problem set #5 introduction: Ecosystem Services Valuation, Travel Costs, Water Quality. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday October 27 and be prepared to lead discussion.**

**October 25: *Introduction to Benefit Valuation: Revealed Preference*****Lecture 10. Lecture 11*** Travel Cost Method
* Hedonic Prices—property valuation
* Hedonic Pricing discussion file.
* Examples of Hedonic Pricing Calculations.

**October 27: Problem Set #5: Ecosystem Valuation, Water Quality.****Lecture 12.*** Discussion of Ecosystem Valuation, Travel Cost, Water Quality. Problem led by Dan Szmurlo and selected students.
* Group Project Benefit Calculation discussion.

**November 1: *Introduction to Benefit Valuation: Contingent Valuation. Examples*** **Lecture 11. Lecture 13*** More hedonic pricing examples.
* Averting behavior.
* Abdalla et al (1992) Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination. Land Economics 68(2): 163-69.
* Glenn C. Bloomquist (2003) Self Protection and Averting Behavior, Values of Statistical Lives, and Benefit Cost Analysis of Environmental Policy, National Center For Environmental Economics, EPA, Working Paper 03-02.

**November 3: Introduction of Problem Set #6, Valuation of Ecosystem Services: Prairie Restoration. Lecture 13.*** Problem set #6 introduction: Value of Ecosystem Services: Prairie Restoration. **Individuals submit analysis to Gary Libecap/Dan Szmurlo by 8 am Thursday November 10 and be prepared to lead discussion.**
* Contingent Valuation Surveys
* Discussion of survey instruments: Kotchen and Reiling; Loomis.
* Class discussion of CV in GP analyses.

**November 8: First Team Presentations with Critical Reviews by Class:****Lecture 14.*** Benefit/Cost Valuation: 10 minutes per team. 3-4 teams.

**November 10: Problem Set # 6 Valuing Ecosystem Services, Prairie Restoration, Travel Cost and Hedonic Measures. Lecture 15.*** Discussion of valuation of ecosystem services, prairie restoration, led by Dan Szmurlo and selected students.
* Contingent Valuation.

**November 15: Second Team Presentations with Critical Reviews by Class.****Lecture 16*** Benefit/Cost calculations, 10 minutes per team, 3-4 teams.

**November 17:** **Lecture 17.*** Readings: Pearce, et al, Chapter 7, 8.
* 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.
* 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.
* Whale, Fire Survey Instruments

**November 22: *Introduction to Benefit Valuation Continued; Contingent Valuation*** **Lecture 18*** Kotchen and Burger (2007) “Should we Drill in the Arctic National Wildlife Refuge? An Economic Perspective,” *Energy Policy*
* Kotchen and Reiling (2000) “[Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species](http://www2.bren.ucsb.edu/~kotchen/links/environ.pdf),” *Ecological Economics*32: 93-107.
* Kotchen and Reiling Survey Instruments

**November 24: No class Thanksgiving Holiday****November 29: Benefit Measures: Health *Valuing Health and Life Risk*****Lecture 19.** * Pearce et al, Chapter 14
* James K. Hammitt (2007) “Valuing Changes in Mortality Risk; Lives Saved Versus Life Years Saved” REEP 1(2): 228-233 only.
* W. Kip Viscusi (2008) “Value of Life” Palgrave Dictionary of Economics.
* Class discussion of human valuation issues. More complicated than ecosystem services?

**December 1: Third** Team Presentations on Cost/Benefit Calculations, 10 minutes per team, 3-4 teams. **December 8, 8 am: GP CBA analysis due. All research papers (10 pages with references for each project).**  |
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