

Overview

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.

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. To understand these decisions, the course will cover the underlying theory of social decision-making based on a comparison of economic costs and benefits. We will consider numerous applications in the context of environmental and natural resource management, including your own Group Projects. We also will read the peer reviewed literature on key issues in cost-benefit analysis. Some of the material in this class will overlap with what you have already covered in other MESM courses, but given the challenging nature of these concepts and their importance in environmental decision-making, this is a good overlap.

Students in ESM 245 will:

- learn the conceptual foundations of cost-benefit analysis,
- acquire the skills necessary to conduct original cost-benefit analyses,
- understand how to interpret the results and validity of cost-benefit analyses conducted by others, and
- gain an appreciation for the potential advantages and disadvantages of cost-benefit analysis.

Materials

The course draws upon three main resources (referred to below as Pearce, Keohane and EPA, respectively):

Cost Benefit Analysis and the Environment: Recent Developments, David Pearce, Giles Atkinson, and Susana Mourato, OECD, 2006. This is the primary course “textbook.”

Markets and the Environment, Nathaniel Keohane and Sheila Olmstead, Island Press, 2016.

Guidelines for Preparing Economic Analyses, US EPA, 2014.

PDFs of these resources are posted on Gauchospace, and accessible through UCSB’s library subscriptions. You will also have supplemental readings from other sources that will be posted in the relevant week’s folder. The goal is to provide you with readings that will be useful for this course and will also serve as a resource in your future career (in other words, they can be a little dry!).

Attendance and professional conduct

You are all adults and have opportunities and demands on your time other than ESM 245. That said, you will get more out of this class if you are a regular and active attendee. I expect you to conduct yourselves in a professional fashion at all times. That includes showing up on time, being respectful to your classmates, being prepared, not wandering in and out of the room, taking responsibility for knowing what is due when, being honest, etc.

No computers will be permitted in class. This is an evidence-based decision. Rigorous research has shown that allowing computers in the classroom lowers learning by one-fifth of a standard deviation.¹ This is equivalent to the impact of improving teacher quality by a standard deviation! And teacher quality is notoriously hard to improve. There may be some exceptions to this when in-class group work requires accessing and working with materials from Gauchospace. You will be told about these in advance.

Expectations

Your course grade will be based on four assignments, a group presentation, a midterm and a final. The assignments and presentation will be done together with other students who are members of the same Group Project. If your Group Project involves more than 3 people, you will be split into two smaller groups of 2-3. All assignments and presentations will be completed as a group of 2-3. Dates and deadlines are in the course outline, below.

- Group assignments (40%): The only homework in this class is a series of written assignments, intended to build up a cost-benefit analysis for your group project. While not all group projects lend themselves equally well to cost-benefit analysis, all involve some component where cost-benefit analysis could deepen your understanding of the problem. The four assignments are summarized below. They are due at the beginning of class and should be submitted electronically to both Professor Jack and the TA. You should plan to meet with the TA about the assignments as you develop them. You should also plan to meet with Professor Jack as a group before handing in Assignment 1.
 - Assignment 1: Clear articulation of the problem – define the object of the CBA and the counterfactual, identify standing (i.e. whose benefits and costs should count), review decision rules
 - Assignment 2: Identifying costs and benefits and measuring costs – assigning things to the right side of the ledger, list out all candidate costs and benefits, quantify costs and/or the steps needed to quantify costs (paying attention to when they occur in time and the uncertainty surrounding them)
 - Assignment 3: Measuring benefits – list out all different types of benefits, appropriate methodologies for each, data needs, etc.; if data are available, conduct preliminary valuation
 - Assignment 4: Pulling it all together – discounting, uncertainty, incidence, potential pitfalls (behavioral, market failures, measurement or data limitations, etc.)
- Group presentation (10%): The group presentation is an opportunity to pull together the highlights from your four assignments into a preliminary cost-benefit analysis for your group project, and to share the results with your classmates. Each group of 2-3 students will do a presentation, so some group projects will be presented on twice. You will have 15-20 minutes for your presentation and we will discuss expectations for the presentations in class well in advance.
- Midterm (20%) and final (20%) exams: The exams will be an opportunity to demonstrate what you have learned in class. Both will consist of quantitative exercises and short open-ended response questions. Practice exams will be posted in advance and we will use class time to review and prepare for the exams.
- Participation (10%): You will receive points for actively contributing to class discussions, engaging with your group assignments and coming to class regularly.

¹ Carter, S. P., Greenberg, K., & Walker, M. S. (2017). The impact of computer usage on academic performance: Evidence from a randomized trial at the United States Military Academy. *Economics of Education Review*, 56, 118-132.

Course outline

Readings are listed next to the class for which they are relevant; read them before class to get the most out of lecture.

Topic	Readings * indicates optional	Deadlines	Date
Class 1: Introduction to cost-benefit analysis <ul style="list-style-type: none"> - An example - A brief history of CBA - Course logistics 	Pearce Chapter 1 Atkinson and Mourato “Environmental Cost-Benefit Analysis” * Executive order 12291		September 27
Class 2: The foundations of cost-benefit analysis <ul style="list-style-type: none"> - Producer and consumer surplus - Market failures - Efficiency definitions 	Keohane Chapter 2 Pearce Chapter 2		October 2
Class 3: Stages of cost-benefit analysis, and alternative decision rules <ul style="list-style-type: none"> - Defining the project - Standing and scope - Decision rules 	Pearce Chapters 3+4	Introduce Assignment 1	October 4
Class 4: Impacts and counterfactuals <ul style="list-style-type: none"> - Defining the counterfactual - Opportunity cost - Comparisons among projects or policies 	EPA Chapter 5 Ferraro “Counterfactual Thinking and Impact Evaluation in Environmental Policy”		October 9
Class 5: Discounting <ul style="list-style-type: none"> - Net present value analysis - A few formulas - Inflation, real values and nominal values 	Pearce Chapter 13 EPA Chapter 6		October 11
Class 6: Risk and uncertainty <ul style="list-style-type: none"> - Sources of uncertainty - Sensitivity analysis - Concept of a “project beta” 	Boardman “Risk and Uncertainty” * EPA “Probabilistic risk assessment”		October 16
Class 7: Introduction to measurement and midterm preparation <ul style="list-style-type: none"> - Transitioning to measurement - Primary and secondary markets and impacts - Benefit transfer - Midterm prep 	Pearce Chapter 6 Keohane Chapter 3	Assignment 1 due; introduce Assignment 2	October 18
Class 8: Measuring costs <ul style="list-style-type: none"> - Opportunity cost (again) - Structure of the market 	EPA Chapter 8 Harrington et al. “On the Accuracy of Regulatory Cost Estimates”		October 23

– Unemployment and jobs			
Class 9: In-class midterm			October 25
Class 10: Measuring benefits – Stated preferences – Contingent valuation – Choice experiments	Pearce Chapter 8 Portney “The Contingent Valuation Debate” * Pearce Chapter 9		October 30
Class 11: Measuring benefits – Revealed preferences I – Travel cost method – Averting behavior and defensive expenditures	Pearce Chapter 7		November 1
Class 12: Measuring benefits – Revealed preferences II – Hedonic valuation – Value of a statistical life	Pearce Chapter 14 Cameron “Euthanizing the Value of a Statistical Life”	Assignment 2 due; introduce assignment 3	November 6
Class 13: Adding up and aggregation – Double counting – Introduction to welfare weights			November 8
Class 14: Incidence and distributional issues – Kaldor-Hick revisited – Identifying winners and losers	Pearce Chapter 15		November 13
Class 15: Threats to CBA I – Information failures – Behavioral biases	Robinson and Hammit “Behavioral Economics and the Conduct of Benefit-Cost Analysis” * Pearce Chapter 11		November 15
Class 16: Threats to CBA II – Other market failures – Political economy	Pearce Chapter 19	Assignment 3 due; introduce assignment 4	November 20
November 22: Thanksgiving, no class			
Class 17: Summary and review – Course recap – Final exam prep			November 27
Class 18: In-class group presentations			November 29
Class 19: In-class group presentations			December 4
Class 20: In-class group presentations			December 6
Finals week		Assignment 4 due	December 10
Final exam			December 13