

Cost-Benefit Analysis (90-824)

Carnegie Mellon University
Spring 2019, Heinz College
Wednesdays, 6:00-8:50 pm

Faculty Contact Information

Tony Cheesebrough, Adjunct Professor

acheeseb@andrew.cmu.edu

Office hours: After class or email for appointment

Izzy Guyott, Teaching Assistant

isabella.guyott@gmail.com

Review sessions: as announced

Course Description

Individuals and organizations are frequently presented with decisions about how best to allocate limited resources. Public organizations in particular have an obligation to use consistent and transparent analytic tools to inform tradeoffs among competing policy priorities such as the environment, health, safety, and security. Economics provides a theoretical foundation for the allocation of scarce resources, but in practice, there are a variety of challenges in measuring benefits and costs in quantitative and monetary terms. Such challenges include determining how to value benefits and costs experienced in the future, reductions in the risk of premature death and injury, and the distribution of these impacts among affected populations, as well as appropriately characterizing uncertainty. The ability to assess key assumptions and limitations is critical for both producers and consumers of cost-benefit analysis.

Learning Objectives

Through case studies, discussions, readings, lectures, problem sets, written assignments, and presentations, students will develop knowledge and skills that will enable them to:

- Understand and identify the assumptions and limitations of cost-benefit analyses.
- Critically assess cost-benefit analyses conducted by others.
- Evaluate and compare alternative policies using the tools of cost-benefit analysis and microeconomics.
- Communicate the results of the cost-benefit analysis to stakeholders in such a way as to facilitate political or administrative processes.
- Apply the analytic tools and techniques of cost-benefit analysis and microeconomics in the formulation and assessment of real-world policies.
- Contribute to the development of defensible and transparent cost-benefit analyses.

The learning objectives above will be evaluated by completion of the course requirements below.

Course Requirements

Course grades will be based on the following requirements:

1. Class participation and engagement (35 percent)
 - In addition to completing reading assignments for each class, active participation in class discussion and acceptance of cold calls in class are expected.
 - For certain classes, students may be asked to complete a discussion problem in advance of the class. Students will sometimes be asked to submit responses electronically in advance of class. We will ask 1-2 students to volunteer to lead the class discussion for the problem for each class.
 - The participation and engagement grade will depend on regular attendance and active involvement in class discussions, presentations, and discussion problems. Students are expected to attend all classes, but may be granted an excused absence that could include an illness or personal emergency or an apprenticeship-related travel/opportunity worked out in advance of the missed class. Please try not to miss class, as class discussions and lectures are the most important source of information for the final project. If you are late or have to miss class, please be sure to get notes from a classmate and download relevant materials from Canvas.
2. CBA in the News (10 percent)
 - Students will organize into pairs to prepare a short presentation (5-10-minutes) about contemporary cost-benefit analysis issues in the news, drawn from a current newspaper, magazine, or journal article selected by each student. Beyond being related to cost-benefit analysis, the only requirement for selecting the issues is that it interests you!
 - Beginning on January 23rd, each class 1-2 pairs of students will be presenting. The Teaching Assistant will organize the schedule of presentations; please let the Teaching Assistant know when you would like to present.
3. Problem sets (20 percent)
 - There will be two problem sets that will include work on spreadsheets and computer models and simulations.
 - Collaboration on problem sets must not include the preparation of final answers: all students must write up their answers independently. This means that problem set collaboration is limited to discussion only, perhaps with the help of a white board or scrap paper. No text, Excel formula, or equation should be copied verbatim in the process, and no student should share his or her write-ups with others. While students may share a common approach and even final numeric solutions, all write-ups must be independent. That said, be open and generous in your discussions; helping others is a good thing in CBA, as in life.
4. Final Project (35 percent)
 - The final project for this course requires students to organize into several small groups to analyze real-world cost-benefit analyses, and then to prepare and deliver a memo that evaluates the CBA and a presentation of the group's evaluation in class on March 6th.

- Each group will select a completed cost-benefit analysis to analyze from among a sample provided in class.

Late assignments are penalized 10 points immediately and then 10 additional points for each additional 24-hour period.

Course Materials

There is no required textbook for the course. However, a number of the classes will include selections from the following text:

- [*Cost-benefit Analysis: Concepts and Practice*](#) (Boardman, A.E., D.H. Greenberg, A.R. Vining, and D.L. Weimer, 2011, Fourth Edition). Upper Saddle River, N.J.: Pearson. The text is available for purchase online at [Amazon](#).

Although the required selections from the text will be posted on Canvas, students may wish to purchase the text for additional reading beyond the selections provided. In addition to the text, other readings will include case studies, journal articles, book chapters, and published cost-benefit analyses. As with the selections from the text, these materials will be posted to the course page on Canvas. The syllabus and reading list may be revised throughout the semester and all updates will be announced in class and posted on Canvas.

Use of Electronic Devices during Class

Please do not use laptops, cell phones, or other electronic communication devices during class. For those of you who like to have typed notes, I will provide class notes on Canvas.

Academic Integrity

Students are expected to honor the letter and the spirit of the Carnegie Mellon University Policy on Academic Integrity. Students are expected to familiarize themselves with this policy. Students are also encouraged to review the Carnegie Mellon University Academic Disciplinary Actions Overview for Graduate Students, which details penalties and sanctions, as well as students' rights. Departmental leadership will be consulted on appropriate action for all violations of the Policy on Academic Integrity.

- [Carnegie Mellon University Policy on Academic Integrity](#)
- [Carnegie Mellon University Academic Disciplinary Actions Overview for Graduate Students](#)

Course Overview

Week	Lecture Topics
January 16	Conceptual Framework
January 23	Economic Foundations
January 30	Valuing Market Effects
February 3	First problem set due
February 6	Time Preferences and Discounting
February 13	Nonmarket Valuation
February 17	Second problem set due
February 20	Risk and Uncertainty
February 27	Limitations and Alternatives
March 6	Final projects

Weekly Class Meetings, Readings, and Assignments

January 16: Conceptual Framework

Read:

- “Learning by the Case Method,” Harvard Kennedy School (HKS) note N15-86-1136. Please be sure to read this note before you read the case.
- HKS Case 2084.0, “Miami-Dade County and Sea Rise.” Please read the case and come to class prepared to explain what you would advise Mayor Gimenez to do.

January 23: Economic Foundations

Read:

- Boardman et al. Chapter 3, “Microeconomic Foundations of Cost-benefit Analysis,” pages 52-56 (skip section on Taxes on pages 56-57), pages 57-61
- Kellogg School of Management, Case KEL001, “Sugar Daddy: Quotas and the U.S. Government.” Please read the case and come to class prepared to discuss your responses to the 5 questions on page 4 of the case.

January 30: Valuing Market Effects

Read:

- Boardman et al. Chapter 4, “Valuing Benefits and Costs in Primary Markets,” pages 78-85, 91-94, and 99-104.
- HKS Case 1973.0, “Corporate Average Fuel Economy Standards 2017-2025.” Please read the case and be prepared to discuss the following questions:
 1. What are the major costs and benefits of the proposed rule? Which are private (borne by the party making the decision) and which are external (borne by other parties)?
 2. What factors do you think explain the fact that the current fuel efficiency of vehicles is substantially less than the NHTSA's estimates of costs and benefits indicate would be in the private interests of vehicle buyers and manufacturers?
 3. What policy alternatives are there to CAFE standards? What are their relative pros and cons?

February 6: Time Preferences and Discounting

Read:

- Boardman et al. Chapter 6, “Discounting Benefits and Costs in Future Time Periods,” pages 133-141
- Arrow, K. et al. 2013. “[Determining Benefits and Costs for Future Generations.](#)” Science. 341: 349-350.
- HKS Case 1932.0, “Electric Vehicles in Cities.” Please read the case and be prepared to discuss the following questions:
 1. Does it make sense for San Francisco to unilaterally provide a public good?
 2. Are consumers likely to adopt electric vehicles in large number?
 3. How substantial are the savings in greenhouse gas emissions per vehicle mile?
 4. On what does the difference in operating costs depend?
 5. Be prepared to organize into small groups for an exercise to estimate how sensitive the results in Exhibits 8 and 9 are to the assumption of the discount rates.

February 13: Nonmarket Valuation

Read:

- HKS Case 1680.0, “Arsenic in Drinking Water.” Please read the case and be prepared to explain and justify what you would do if you were EPA Administrator Whitman. As part of your answer please consider:
 1. What does the CBA show?
 2. How were benefits estimated? Why might benefits have been understated? Why might benefits have been overstated?
 3. What does the marginal analysis of costs and benefits indicate?
- Schelling, T. “The Life you Save May be Your Own,” in the book Choice and Consequence, Harvard University Press, 1985, pp. 113-146.

February 20: Risk and Uncertainty

Read:

- HBS Case 9-181-027, “Freemark Abbey Winery.” In preparation for the case, please draw a decision tree for Mr. Jaeger’s problem. Also think about the following questions:
 1. Are there any missing data? If so, what are they and are they relevant?
 2. What conclusions do you draw from your analysis? That is, what would you advise Mr. Jaeger to do?
 3. How sensitive are your conclusions to Mr. Jaeger’s probability assessments?
 4. To what extent might risk be a factor in Mr. Jaeger’s decision?
- Slovic, Fischhoff, Lichtenstein, (1982), [Why Study Risk Perception?](#) *Risk Analysis*, Vol. 2, No. 2. 1982
- Pages 11-15 (up to Section 3.5 on “Completion of the Scenario List”) in Kaplan and Garrick, (1981). On the Quantitative Definition of Risk, *Risk Analysis*, Vol. 1, No, 1.

February 27: Limitations and Alternatives to CBA

Read:

- Kelman, (1981), Cost-benefit Analysis: An Ethical Critique. *AEI Journal on Government and Society Regulation* (January/February 1981), 33-40.
- Robinson, L.A., J.K. Hammitt, and R. Zeckhauser, (2014). [The Role of Distribution in Regulatory Analysis and Decision Making](#), Regulatory Policy Program Working Paper RPP-2014-03, Mossavar-Rahmani Center for Business and Government, Harvard Kennedy School.

March 6: Final projects