



## BENEFIT-COST ANALYSIS

### Syllabus

API-139M

Spring 2014, Module Period 3

**OVERVIEW:** Policy decisions inevitably require difficult trade-offs. If we devote more resources to reducing pollution or improving education, we will not be able to use those resources for other purposes, including investment in other programs that address similar goals. Benefit-cost analysis explicitly recognizes these trade-offs, considering whether those affected will benefit enough to warrant the costs of a policy. Such analysis is required for major regulations in the United States and elsewhere and is increasingly used to support policy decisions around the world. Understanding its advantages and limitations, and being able to distinguish well-conducted from poor analysis, is an important skill. This module covers the basic components of benefit-cost analysis including estimating impacts, valuing outcomes using market prices, valuing outcomes that are not as easily measured in monetary terms (such as environmental quality, health, and longevity), and addressing uncertainty. Sessions mix lectures, discussion, and case studies to explore practical as well as conceptual and theoretic issues. The module is designed both for those interested in conducting such analysis and for those who wish to become more informed consumers or critics.

**CLASS MEETINGS:** Tuesday and Thursdays, January 28 to March 13, 2:40-4:00 pm, Rubenstein G-20

**SHOPPING SESSIONS** (attendance encouraged but not required): Thursday, January 23, 2:40-3:10 pm or 3:25-3:55 pm, Rubenstein G-20

#### FACULTY CONTACT INFORMATION:

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Faculty Assistant: Veronica Chapman  
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**PREREQUISITES:** Microeconomics provides the primary foundation for benefit-cost analysis. The instructors will assume that students enrolling in this course have taken microeconomics at a level equivalent to API-101 or API-105 or higher. Students who have only taken a lower-level microeconomics course or have particularly relevant experience may register with permission from the instructors, but should expect to spend extra time learning the underlying microeconomic principles and tools.

## A. ASSIGNMENTS AND GRADING

### 1. Major components and weights

Your course grade will be based on the following:

- 30 percent: class participation and engagement
- 25 percent: short assignments
- 45 percent: final project (prospectus and decision memo)

### 2. Assignment types

**Participation and engagement (30 percent):** We expect you to read the assigned material *before* the relevant class. Prior to some classes, we will ask you to answer two or three short questions on the course page. For those classes, you must post your response by 8:00 am on the day of class. We encourage you to read your classmate's comments carefully.

We expect you to engage in class both by listening carefully to others and by contributing constructive and thoughtful comments. Please let the instructors know in advance if you must miss a class.

The participation and engagement grade will depend on your attendance and active involvement in both the web postings and the class meetings. **Please bring your name card to every class.**

**Short assignments (25 percent):** There will be three graded short assignments: two problem sets and one essay (3-5 pages double-spaced). We will provide more information on each assignment in class. All assignments must be submitted through the course page; there will be no credit for assignments received after the deadline.

Under the HKS Academic Code, these are "Type II" assignments. You are encouraged to work with classmates, but must write-up the results entirely on your own. The Kennedy School Academic Code is available at: [http://www.hks.harvard.edu/var/ezp\\_site/storage/fckeditor/file/pdfs/degree-programs/registrar/academic\\_code.pdf](http://www.hks.harvard.edu/var/ezp_site/storage/fckeditor/file/pdfs/degree-programs/registrar/academic_code.pdf).

**Final project (45 percent):** Students will submit a memo that either (1) evaluates a completed benefit-cost analysis and supplements it with additional calculations, or (2) converts a completed program evaluation, impact analysis, or cost-effectiveness analysis into a benefit-cost analysis. You may work on your own or with one other student with the permission of the instructors. We will suggest sources for identifying the analysis that will be the basis for your work, but you may select an analysis that is not on these lists. We expect you to choose an analysis that poses challenging issues related to estimating costs, valuing benefits, discounting, and/or addressing uncertainty.

Your final product will be a decision memo for an official who is not a benefit-cost analysis expert, but who is interested in how such analysis might inform the decision. You will submit a brief prospectus in mid-February and the final memo on March 14. The memo must summarize your work and your findings. You may include short appendices if essential, but remember that your boss is very busy and relying on you to highlight the key issues and reasoning. He is unlikely to have time to read the appendices.

The memo should be 10-15 pages in length, or 15-25 pages if you are working with another student. It must be double-spaced, with 1-inch margins and 11-point (or larger) fonts, and will be submitted through the course page. It must cite all sources using a combination of in-text cites, footnotes, and/or end notes.

### 3. Course grades

We will compute an overall weighted score based on the individual components. Final letter grades for the course will be guided by the HKS Recommended Grade Distribution (available at <http://www.hks.harvard.edu/degrees/registrar/faculty/exams-and-grading/grades>).

## B. COURSE MATERIALS

### 1. Text and other readings

The required textbook is:

- Boardman, A.E., D.H. Greenberg, A.R. Vining, and D.L. Weimer. 2011. *Cost-Benefit Analysis: Concepts and Practice* (Fourth Edition). Upper Saddle River, N.J.: Pearson.

This book is available from The Coop in several versions, including new, used, rental, and eBook. It is also available for sale or rent online (e.g., on Amazon.com, which has the new and rental versions at substantial discounts) and you may be able to find used copies elsewhere at lower prices. It is also on reserve at the HKS library. We recommend buying a copy because it is a good reference to have for future use as well as convenient for use during the module.

Other readings for each class will be available through the course website.

### 2. Course website

All materials other than the text will be posted on the HKS course website (“course pages”). You should check the website before each class as we will use it to provide new materials and update assignments as needed. We will also be posting discussion questions that you must answer before some classes. As mentioned earlier, you will be submitting assignments through the course website.

If you are not an HKS student, you will need to cross-register and obtain HKS “credentials” to access the course website; see <http://www.hks.harvard.edu/degrees/registrar/cross-registration>. Non-HKS students should request access as soon as possible, even if you are not certain that you will enroll. During the first two weeks of classes, Veronica Chapman (the course’s faculty assistant) will check frequently to approve requests for access.

If you have problems gaining access to the course website, please check with Ms. Chapman or IT support. If you have questions about the material on the website, please contact the instructors.

### C. OPTIONAL NON-CREDIT STUDY GROUP

Ms. Robinson is running a separate non-credit study group, “Benefit-Cost Analysis in the Real World: Tales from the Trenches.” The study group consists of seminars lead by experienced practitioners, who will discuss benefit-cost analyses they have conducted. It will meet from January 29 through March 5 on Wednesdays from 2:40 to 4:00 pm in the Hauser conference room, on the lobby level of the Belfer building. For additional information and a detailed schedule, see:

<http://www.hks.harvard.edu/centers/mrcbg/students/sg/benefit-cost-analysis-in-the-real-world-tales-from-the-trenches>.

We encourage you to attend these sessions if you are interested and they fit into your schedule, but participation is completely optional and will not affect your grade for this module.

**D. CLASS AND ASSIGNMENT OVERVIEW**

Thursday, January 23	Shopping day (optional, attendance encouraged)
Tuesday, January 28	Introduction, Framework, and Economic Foundations
Thursday, January 30	Water, Sanitation, and Preventive Health Interventions in Developing Countries
Tuesday, February 4	Framework and Economic Foundations (continued)
Thursday, February 6	Valuing Direct and Indirect Market Effects
Friday, February 7, 6 pm	First problem set due
Tuesday, February 11	Impacts vs. Costs and Benefits: Expansion of Boston Convention Center
Thursday, February 13	Time Preferences and Discounting
Friday, February 14, 6 pm	Prospectus due for final project
Tuesday, February 18	California High Speed Rail
Thursday, February 20	Nonmarket Valuation Using Stated Preferences: Value per Statistical Life
Friday, February 21, 6 pm	Second problem set due
Tuesday, February 25	Nonmarket Valuation Using Revealed Preferences: Valuing Time
Thursday, February 27	Power Plant Cooling Water Intake Controls
Friday, February 28, 6 pm	Short essay due
Tuesday, March 4	Uncertainty Analysis
Thursday, March 6	Uncertainty Analysis (continued)
Tuesday, March 11	Implications of Behavioral Economics
Thursday, March 13	Wrap-up
Friday, March 14, 6 pm	Final decision memo due

**Notes:** Shaded rows indicate assignment due dates rather than class meetings. The assignments listed are only those that will be handed in and formally graded. See earlier discussion of class participation and engagement for information on other types of assignments. All assignments will be submitted through the course website.

**E. DAILY CLASS MEETINGS, READINGS, AND ASSIGNMENTS**

**Thursday, January 23:** Shopping Day (optional but strongly recommended)

- No assignment. In each 30-minute session, we will summarize course goals, requirements, and content.

**Tuesday, January 28:** Introduction, Framework, and Economic Foundations

Read:

- Boardman et al. Chapter 1, "Introduction to Cost-Benefit Analysis." (Read pp. 1-15, skim pp. 15-23.)
- Boardman et al. Chapter 2, "Conceptual Foundations of Cost-Benefit Analysis." (Read pp. 27-34, skim pp. 34-47 for basic concepts; we will return to many of these issues later in the module.)
- Arrow, K.J. et al. 1996. "Is There a Role for Benefit-Cost Analysis in Environmental, Health and Safety Regulation?" *Science*. 272:221-222.

**Thursday, January 30:** Water, Sanitation, and Preventive Health Interventions in Developing Countries

Read:

- Whittington, D., M. Jeuland, K. Barker, and Y. Yuen. 2012. "Setting Priorities, Targeting Subsidies among Water, Sanitation, and Preventive Health Interventions in Developing Countries." *World Development*. 40(8):1546-1568.

**Tuesday, February 4:** Framework and Economic Foundations (continued)

Read:

- Boardman et al. Chapter 3, "Microeconomic Foundations of Cost-Benefit Analysis." (Review carefully to check your understanding of key concepts; appendix is optional and more advanced.)

Note: If you need additional review, you may wish to consult the relevant sections of a microeconomics textbook; MIT also offers an online course that may be of interest for selected topics:

<http://ocw.mit.edu/courses/economics/14-01sc-principles-of-microeconomics-fall-2011/index.htm>

**Thursday, February 6:** Valuing Direct and Indirect Market Effects

Read:

- Boardman et al. Chapter 4, “Valuing Benefits and Costs in Primary Markets.” (Read carefully)
- Boardman et al. Chapter 5, “Valuing Benefits and Costs in Secondary Markets.” (Skim for basic ideas)
- U.S. Office of Management and Budget. 2005. “Chapter III: Validation of Benefit and Cost Estimates made Prior to Regulation” (pages 41-53 in *Validating Regulatory Analysis: 2005 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities*).

**Tuesday, February 11:** Impacts vs. Costs and Benefits: Expansion of Boston Convention Center

Read:

- Massachusetts Convention Partnership. 2011. *Meeting the 21<sup>st</sup> Century* (final report). (Generally skim, but read: Case for hotel pp. 15-19, 22-25, 30-33, 37-47, 51, 54-58. Proposed actions: pp. 68-71. Costs: pp. 104, 108-113. How could it be paid for: pp. 116-127.)
- Levitz, J., and C. McWhirter, “Cities Clash in Battle to Land Conventions,” *Wall Street Journal*, October 12, 2012. Available at: <http://online.wsj.com/news/articles/SB10000872396390444657804578049103969814398>.
- Flyvbjerg, B. 2008. “Curbing Optimism Bias and Strategic Misrepresentation in Planning: Reference Class Forecasting in Practice.” *European Planning Studies*. 16(1):3-21. (Skim, focus on tables and figures showing impacts on estimates and related explanatory text.)

**Thursday, February 13:** Time Preferences and Discounting

Read:

- Boardman et al. Chapter 6, “Discounting Benefits and Costs in Future Time Periods.”
- Arrow, K. et al. 2013. “Determining Benefits and Costs for Future Generations.” *Science*. 341: 349-350.

**Tuesday, February 18:** California High Speed Rail

Read:

- “California High Speed Rail,” HKS case 1935.0.

**Thursday, February 20:** Nonmarket Valuation Using Stated Preferences: The Value per Statistical Life

Read:

- Boardman et al. Chapter 15, “Contingent Valuation: Using Surveys to Elicit Information about Costs and Benefits.” (Focus on basic concepts and issues, not survey design details.)
- Robinson, L.A. and J.K. Hammitt. 2013. “Skills of the Trade: Valuing Health Risk Reductions in Benefit-Cost Analysis.” *Journal of Benefit-Cost Analysis*. 4(1):107-130.
- Corso, P.S., J.K. Hammitt, and J.D. Graham. 2001. “Valuing Mortality-Risk Reduction: Using Visual Aids to Improve the Validity of Contingent Valuation.” *Journal of Risk and Uncertainty*. 23(2):165-184. (Read pp. 165-172 (sections 1 through 4) and pp. 177-179 (section 6), skim remainder. Focus on concepts rather than technical details.)

**Tuesday, February 25:** Nonmarket Valuation Using Revealed Preferences: Valuing Time

Read:

- Boardman et al. Chapter 14, “Valuing Impacts from Observed Behavior: Indirect Market Methods.” (Read for basic concepts, not technical details about estimation and functional form.)
- Fezzi, C., I.J. Bateman, and S. Ferrini. 2014. “Using Revealed Preferences to Estimate the Value of Travel Time to Recreation Sites.” *Journal of Environmental Economics and Management*. 67: 58-70 (Read pp. 58-64 (sections 1 through 3) , and pp. 69-72 (the concluding section); skim remainder. Focus on concepts rather than technical details.)
- U.S. Department of Transportation. 2011. *Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis*. (Read pp. 1-2, 11-14, skim remainder.)

**Thursday, February 27:** Power Plant Cooling Water Intake Controls

Read:

- Excerpts from U.S. Environmental Protection Agency (EPA) Final Regulatory Impact Analysis under Section 316b of Clean Water Act (to be provided, pending release) and supporting documents.

**Tuesday, March 4:** Uncertainty Analysis

Read:

- Boardman et al. Chapter 7, “Dealing with Uncertainty: Expected Values, Sensitivity Analysis, and the Value of Information.” (Read pp. 167-187; pp. 187-194 are optional and require some familiarity with the basics of decision analysis)
- Nichols, A.L. and R.J. Zeckhauser. 1986. “Perils of Prudence: How Conservative Risk Assessments Distort Regulation.” *Regulation*. 10:13-24.



**Thursday, March 6:** Uncertainty Analysis (continued)

Read:

- Materials for in-class exercise (to be provided)

**Tuesday, March 11:** Implications of Behavioral Economics

Read:

- Beshears J., J.J. Choi, D. Laibson, and B.C. Madrian. 2008. "How are Preferences Revealed?" *Journal of Public Economics*. 92:1787-1794.
- Robinson, L.A. and J.K. Hammitt. 2011. "Behavioral Economics and Regulatory Analysis." *Risk Analysis*. 31(9): 1408-1422.
- Portney, P.R. 1992. "Trouble in Happyville." *Journal of Policy Analysis and Management*. 11(1): 131-132.

**Thursday, March 13:** Wrap up

Read:

- TBA