

**Economic Analysis and Evaluation for Public Health and Environment**  
**GLHLTH 531 / PUBPOL 607 / ENVIRON 563**  
**Fall 2015**

Time and Location: Mon/Wed 8:30-9:45 am  
Room: LSRC A247

Instructor: Marc Jeuland  
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Email: [marc.jeuland@duke.edu](mailto:marc.jeuland@duke.edu)

Office Hours: Monday 1:00-2:30 pm; or by appointment

Teaching assistant: Morgan Capilla ([mwc21@duke.edu](mailto:mwc21@duke.edu))  
TA office hours: TBD

### **Course Overview**

Economic analysis, or cost-benefit analysis (CBA), is an important tool for conducting public policy assessments. In simple terms, its purpose is to identify and catalog the impacts of potential projects, to quantify those impacts, and finally to convert them into money terms such that their net benefits can be determined. Since the public sector is often involved in setting health and environmental policy, this course will focus on the use and application of CBA in those areas (and also implications for analysis of social policies). It will cover topics such as the economic rationale for CBA, basic principles for assessing the economic effects of projects, techniques for valuing health and environmental impacts, intergenerational and philosophical concerns as they relate to CBA, social discounting, risk and uncertainty. We will also compare CBA with alternative commonly-used approaches, such as cost effectiveness or multi-attribute analyses.

### **Course Objectives**

By the end of the course, students should:

- Understand the welfare-theoretic underpinnings of CBA;
- Possess knowledge of the ways in which economic and financial analysis differ, and the consequences of that divergence for public policy;
- Have operational understanding of how to conduct CBA in real world project assessments, particularly relating to the environment and health;
- Be able to critically assess common objections to the use of CBA, both practical and philosophical, and demonstrate a nuanced understanding of the strengths and weaknesses of alternative decision-making criteria;

- Have completed a well thought-out research project that may involve carrying out a CBA applied to a specific problem of interest to the student, or may represent a more in-depth study of a general issue or theme discussed during the course.

### **Textbooks**

Boardman, Greenberg, Vining, and Weimer (2010). Cost-Benefit Analysis: Concepts and Practice. 4<sup>th</sup> Edition. Prentice Hall: Upper Saddle River, NJ.

### **Optional for more technical treatment of issues:**

Layard and Glaister. Cost-Benefit Analysis (1994). Cambridge University Press: Cambridge, UK.

A set of other required and optional readings will be posted on blackboard.

### **Expectations**

Students are expected to:

- Be fully prepared to discuss readings assigned for each class period
- Attend all class sessions
- Submit assignments on time (no late assignments will be accepted)
- Engage in civil and informed in- and out-of-class discussions.

### **Grading**

Student grades will be computed as follows:

- General participation (10%)
- 4 written assignments (40%)
- Student presentation/debate (15%)
- Research project (35%)

All assignments will receive letter grades. If you have questions about how your grade has been determined, please feel free to ask the instructor outside of class meeting times.

General participation. Your general participation grade will be determined based on the following combination of factors: a) Attendance in class; b) Participation in class and evidence of engaging with the readings; c) Reaction and comments on other students' presentations; and d) Contribution to participatory components of the written assignments.

Written assignments (4). Details on these assignments will be provided throughout the course. They will usually involve some quantitative analysis and will typically be submitted with short write-ups (summaries of the analysis or policy memos) plus an accompanying spreadsheet. There may be group components to these assignments.

Student presentation / debate (1). Each student will be responsible for working with 1 or 2 others to discuss a course topic in the format of a debate. Assignments to these groups and topics will be random and will occur early in the semester, once the final roster is stable. Each student will also submit a reflection on his/her assigned debate topic.

Research paper. Students have two options for the research paper. They may either conduct a CBA of a health or environmental investment of their choosing, or conduct a more detailed (philosophical or theoretical) exploration of some controversial theme or issue in CBA that they find interesting. For the former, students will be expected to a) explain why their investment is relevant and of interest (justification), b) identify impacts of the project relative to the appropriate policy baseline (cataloguing), c) collect relevant data for the analysis (quantification), d) attempt to value those impacts as best they can (monetization), and e) carry out and discuss the results of (and challenges faced in) their analyses. For the latter, students will be expected to conduct a serious literature review or meta-analysis on their topic, discuss the nature of the controversy and debate over the issue, and explain how it relates to current policy-relevant problems.

### Tentative Meeting Schedule

Unit 1: Welfare-theoretic foundations for CBA

1. The concept of economic value (Aug. 24)
2. Basics of welfare theory and justification for CBA (Aug. 26)
3. Rationality, ethical issues, and critiques of CBA (Aug. 31)

**Assignment 1 (Mincomp Project Case)** out Aug. 31; due Sep.14.

Unit 2: Economic vs. financial analysis

1. Basic tools of economic / financial analysis (Sep. 2)
2. Working w/Spreadsheets I: Nuts and bolts of economic analysis - (Sep. 7, **bring your laptops**)
3. Investment decision rules and capital budgeting problem (Sep. 9)

Unit 3: Partial versus general equilibrium effects; second-best issues (shadow pricing)

1. Valuing costs and benefits in primary markets (Sep. 14); discussion of Assignment 1
2. Valuing costs and benefits in secondary markets and in general equilibrium (Sep. 16)
3. Working w/Spreadsheets II: Applying CBA principles (Sep. 21, **bring your laptops**)
4. Shadow pricing: Capital, labor, time savings (Sep. 23/28/30)

**Assignment 2 (Practicing Nuts and Bolts)** out Sep. 21; due Oct. 7.

Unit 4: Reflections on discounting; intergenerational and philosophical issues

1. Social rate of discount and Ramsey discounting (Oct. 2)
2. Poverty weights and distributional analysis (Oct. 7)

**Assignment 3 (Valuation)** out Oct. 14; due Oct. 28.

Unit 6: Valuation (stated and revealed preference techniques)

1. Stated preferences (Oct. 14)
2. Travel cost method (Oct. 19)
3. Hedonic approaches (Oct. 21)
4. Comparison of nonmarket valuation methods (Nov. 26)
5. Applications; discussion of assignment 3 (Oct. 28)

Unit 5: Risk and uncertainty; alternative decision rules under uncertainty

1. Expected values, risk and option value; discussion of assignment 2 (Nov. 2)
2. Working w/Spreadsheets III: Monte Carlo and other sensitivity analysis (Nov. 4, **bring your laptops**)

**Assignment 4 (Comparing CBA and CEA)** out Nov. 2; due Nov. 16.

Unit 7: Cost-effectiveness analysis and alternative prioritization methodologies

1. Cost-effectiveness analysis (Nov. 9)
2. Decision matrices and multi-objective approaches (Nov. 11)

Unit 8: Research and practice with CBA: Current topics and reflections

1. Some applications / examples; discussion of assignment 4 (Nov. 16)
2. How accurate is CBA and other decision methods? (Nov. 18)

Course wrap up (Nov. 23)

**Research project due:** Friday, Dec. 4 at Midnight

### Detailed reading list

Unit 1: Introduction and welfare-theoretic foundations for CBA

1. The concept of economic value

2. Basics of welfare theory; equivalent and compensating variation; WTA vs. WTP

BGVM, Ch. 1-3, pp. 1-77 (by Aug. 26)

[Tversky, A. and D. Kahneman. "The Framing of Decisions and the Psychology of Choice," \*Science\* 211 \(30 Jan. 1981\): 453-458.](#)

3. Rationality, ethical issues, and critiques of CBA (by Aug. 31)

[Shabman, L. and K. Stephenson \(2000\). "Environmental valuation and its economic critics." \*Journal of Water Resources Planning and Management\* 126\(6\): 382-388.](#)

[Sen, Amartya K., "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory," \*Philosophy and Public Affairs\*, 6 \(Summer 1977\): 317-344.](#)

[Williams, A. \(1972\). "Cost-Benefit Analysis: Bastard Science? And/or Insidious Poison in the Body Politick." \*Journal of Public Economics\* 1\(2\): 199-225](#)

**Optional:**

[Whittington, Dale, and Duncan MacRae, "The Issue of Standing in Cost-Benefit Analysis." \*Journal of Policy Analysis and Management\*, 5 #4 \(Summer 1986\): 1-18.](#)

[Bromley, Daniel W., "The Ideology of Efficiency: Searching for a Theory of Policy Analysis," \*Journal of Environmental Economics and Management\*, \(1990\): 86-107.](#)

[Conlisk, J. \(1996\) "Why Bounded Rationality?" \*Journal of Economic Literature\* 34: 669-700.](#)

[Sen, Amartya K., "Economic Judgments and Moral Philosophy," Chap. 2 in his \*On Ethics and Economics\* \(Oxford University Press, 1987\).](#)

Unit 2: Economic vs. financial analysis

1. Introduction to basic toolkit for economic / financial analysis: discounting and inflation, depreciation, annualized costs, discounted cash flow analysis

BGVM, Ch. 6, pp. 133-166 (by Sep. 2)

2. Investment decision rules (by Sep. 9)

[Mishan, E.J. Chapters 29-34, pp. 203-236, in \*Cost-benefit Analysis\*, George Allen & Unwin. 1984.](#)

3. The capital budgeting problem (by Sep. 9)

[Sugden, Robert, and Alan Williams. "Input Constraints," Ch 6 in \*The Principles of Practical Cost-benefit Analysis\*. Oxford University Press \(1978\). pp. 74-86.](#)

Unit 3: Partial versus general equilibrium effects; second-best issues (shadow pricing); market imperfection

1. Valuing benefits and costs in primary markets (by Sep. 14)

BGVM, Ch. 4, pp. 78-114

2. ...in secondary markets (by Sep. 16)

BGVM, Ch. 5, pp. 115-132

3. Complete economies: input-output analysis; general equilibrium

**Optional:**

[Robinson, S. \(1989\). \*Multisectoral Models\*. In: \*The Handbook of Development Economics, Volume II\*. Elsevier Science Publishers B.V. Pp. 885-913.](#)

4. Shadow pricing: capital, labor and time savings

BGVW, Ch. 16, pp. 406-442. (by Sep. 23)

[Whittington, Dale, Xinming Mu, and Robert Roche. "Calculating the Value of Time Spent Collecting Water: Some Estimates for Ukunda, Kenya." \*World Development\* 18 #2 \(1990\). \(by Sep. 23\)](#)

Dasgupta, Partha, Amartya Sen, and Stephen Marglin. [Chapters 8](#) (pp. 85-98), [Chapter 14](#), and [Chapter 15](#) (pp. 173-212), in *Guidelines for Project Evaluation*. United Nations, 1972. (by Sep. 28)

**Optional:**

*L-G: Ch. 1 (Drèze and Stern)*

L-G: Ch. 2 (Sen)

Unit 4: Reflections on discounting; intergenerational and philosophical issues

1. The social rate of discount and Ramsey discounting (by Oct. 2)

BGVW, Ch 10, pp. 238-273.

[Cropper, M.; S. Aydede; and P. Portney. \(1994\). "Preferences for life-saving programs: How the public discounts time and age." \*Journal of Risk and Uncertainty\* 8: 243-265.](#)

**Optional:**

[Frederick et al. \(2002\). "Time Discounting and Time Preference: A Critical Review." \*Journal of Economic Literature\* 40 \(2\): 351-401.](#)

[Weitzman, M. \(2001\). "Gamma Discounting." \*The American Economic Review\* 91 \(1\): 260-271.](#)

[Jeuland, M. \(2010\). "Social discounting of large dams with climate change uncertainty." \*Water Alternatives Special Issue on the World Commission on Dams\* 3\(2\): 185-206.](#)

3. Poverty weights and distributional analysis (by Oct. 7)

BGVW, Ch 19, pp. 489-506.

[Loomis, J. \(2011\). "Incorporating Distributional Issues into Benefit Cost Analysis: Why, How, and Two Empirical Examples Using Non-market Valuation." \*Journal of Benefit-Cost Analysis\* 2\(1\): Article 5.](#)

Unit 5: Approaches to nonmarket valuation (stated and revealed preferences)

1. Contingent valuation methods (CVM) (by Oct. 14)

BGVW, Ch. 15, pp. 372-405.

[Smith, V. Kerry. "Fifty Years of Contingent Valuation." Chapter 2 in \*Handbook on Contingent Valuation\*. Edited by Anna Alberini and James R. Kahn. Edward Elgar, 2006. pp. 7-65.](#)

Carson, Richard T., Nicolas E. Flores, and Norman F. Meade. "Contingent Valuation: Controversies and Evidence." *Environmental and Resource Economics*. Vol. 19, pp. 173-210, 2001.

**Optional:**

Kahneman, Daniel and Jack Knetsch, "Valuing Public Goods: The Purchase of Moral Satisfaction." *Journal of Environmental Economics and Management* 22.1992: 57-70.

Whittington, D. (2010). "What Have We Learned from 20 Years of Stated Preference Research in Less-Developed Countries?" *Annual Review of Resource Economics* 2:209–36.

2. Existence values (by Oct. 14)

BGVM, Ch. 9, pp. 224-237.

Rosenthal, Donald H. and Robert Nelson (1992). "Why Existence Value Should Not be Used in Cost-Benefit Analysis." *Journal of Policy Analysis and Management* 11(1): 116-122.

Kopp, Raymond. "Why Existence Value Should be Used in Cost-Benefit Analysis." *Journal of Policy Analysis and Management* 11(1): 123-130.

2. Revealed preference methods: travel cost and hedonic models

Jeuland, M.; M. Lucas; J. Clemens; D. Whittington (2009). "Estimating the private benefits of vaccination against cholera in Beira, Mozambique: a travel cost approach." *Journal of Development Economics* 91: 310-322. (by Oct. 19)

Viscusi and Aldy (2003). "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World" *Journal of Risk and Uncertainty* 27(1): 5-76. (by Oct. 21)

Smith, V.K. and Huang, J. (1995) "Can Markets Value Air Quality? A Meta-Analysis of Hedonic Property Value Models." *The Journal of Political Economy* 103(1): 209-227. (by Oct. 21)

**Optional:**

Hammitt, J.; L. Robinson (2011). "The Income Elasticity of the Value per Statistical Life: Transferring Estimates between High and Low Income Populations." *Journal of Benefit-Cost Analysis* 2(1): 1-27.

4. Reflections on other approaches: productivity approach; cost of illness (by Oct. 26)

Bahl, Rajiv, Anju Sinha, Christine Poulos, Dale Whittington, Sunil Sazawal, Ramesh Kumar, Dilip Mahalanabis, Camilo J Acosta, John Clemens, Maharaj K Bhan. "Costs-of-illness of



[typhoid fever in Indian urban slum community: implications for vaccination policy." \*Journal of Health, Population, and Nutrition\*. Vol. 22, No. 3, pp. 304-310, 2004.](#)

#### Unit 6: Risk and uncertainty; alternative decision rules under uncertainty

1. Expected value and option value, tools for sensitivity analysis (Monte Carlo analysis) (by Nov. 2)

BGVM, Ch. 7-8, pp. 167-201.

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

#### **Optional:**

[Ceylan and Ford \(2002\). "Using Options to Manage Dynamic Uncertainty in Acquisition Projects." \*Acquisition Review Quarterly\* 9 \(4\): 243-258.](#)

[Pindyck, R. \(1991\). "Irreversibility, Uncertainty, and Investment." \*Journal of Economic Literature\* 29\(3\): 1110-1148.](#)

L-G: Ch. 4 (Arrow and Lind)

#### Unit 7: Cost-effectiveness analysis and alternative prioritization methodologies

BGVM, Ch. 18, pp. 464-488. (by Nov. 9)

[Jeuland, M.; J. Cook; J. Clemens; C. Poulos; D. Whittington; DOMI Cholera Economics Study Group \(2009\). "Incorporating herd protection into cost-effectiveness calculations of new generation oral cholera vaccines: a multi-site analysis." \*Value in Health\* 12 \(6\), 899-908. \(by Nov. 9\)](#)

[Slovic, P. \(1999\). "Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield." \*Risk Analysis\* 19\(4\): 689-701 \(by Nov. 11\)](#)

[Keeney, R. and Wood, E. \(1977\). "An illustrative example of the use of multiattribute utility theory for water resource planning." \*Water Resources Research\* 13\(4\): 705-712. \(by Nov. 11\)](#)

Unit 8: Research and practice with CBA: Current topics and reflections

1. How can it be done? Case studies of recent CBAs and challenges raised in the literature (by Nov. 16)

[Pearce, D. \(1998\). "Cost benefit analysis and environmental policy." \*Oxford Review of Economic Policy\* 14\(4\): 84-100.](#)

[Jeuland, M. \(2010\). "A Cost-Benefit Analysis of Cholera Vaccination Programs in Beira, Mozambique." \*World Bank Economic Review\* 23\(2\): 235-267.](#)

***Optional:***

[Whittington, D. and W. N. Grubb \(1984\). "Economic Analysis in Regulatory Decisions: The Implications of Executive Order 12291." \*Science, Technology, & Human Values\* 9\(1\): 63-71.](#)

2. How accurate / useful is CBA? (by Nov. 18)

BGVM, Ch. 20, pp. 507-520

[Boardman et al. \(1994\). "Learning from Ex Ante/Ex Post Cost-Benefit Comparisons: The Coquihalla Highway Example. \*Socio-Econ Plann Sci\* 28 \(2\): 69-84.](#)