

THE WHARTON SCHOOL
University of Pennsylvania

COST-BENEFIT AND COST-EFFECTIVENESS ANALYSIS
HCMG 901/301

Fall 2012

Thursdays 4:30-7:00, Chestnut Room in CPC

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OVERVIEW

This seminar-style course provides an introduction to the use of cost-benefit and cost-effectiveness analysis in health care. We examine both the underlying theory and the practical application of these techniques, using studies from the literature and issues discussed by students in class. The focus is on applications in health care, which differ from those used in contexts of public decision-making. A key focus will be on the extent to which this type of analysis assembles information which decision-makers do or should find helpful, especially in the context of public and private insurance.

COURSE FORMAT AND REQUIREMENTS

Class participation. The class format is lecture/discussion. We will take a break at about 4:15. Students are expected to read the required readings before each session and come prepared to participate in class discussion.

Short midterm paper. Students will be asked to write a short (10 page) paper critiquing and commenting upon the relevance of the methods and the conclusions of the published studies on the cost effectiveness of screening for Abdominal Aortic Aneurysm. Critiques should concentrate on the fundamental ideas in cost-benefit and cost-effectiveness analysis. They should also deal both with the extent to which they provide useful information for relevant decision-makers and the extent to which these studies meet the criteria proposed by the Petrov and Gray (BMJ, 2011) and the checklist provided in Chapter 3 of the Drummond book. **Due date October 11 (30%).**

Three-quarter quiz. This is a closed book, in-class test, administered after completion of the formal analysis material. It will cover the main principles and methods that have been covered in the readings and lectures (30%). **The quiz will be November 15.**

Term project. Each student will develop a term project in the form of a decision-maker's question and a CB or CE analysis which would answer it (on a topic of your choice, subject to approval). **An outline of the topic and proposed approach will be due on October 25.** The term project will be presented orally, with written supplementation such as the power point presentation (40%) on the last day of class: **December 6.**

CLASS OUTLINE AND READINGS

Below is a list of required and supplementary textbooks. A coursepack of additional required reading (book chapters, etc.) is available for order online through www.study.net. You may choose to download electronic copies of the files, or request a hard-copy coursepack. Readings that are optional are indicated in the reading list with an asterisk; they may be referred to in class.

Required Texts (available at Penn Bookstore)

Drummond, Michael E., Mark Sculpher, Bernie O'Brien, Greg Stoddart, and George W. Torrance. Methods for the Economic Evaluation of Health Care Programmes, 3rd ed., 2005.

Brent RJ. Cost-Benefit Analysis and Health Care Evaluations. Edward Elgar. 2003.

Additional Texts (available at Penn Bookstore)

Gold, Martha. Cost Effectiveness in Health and Medicine. Oxford University Press, 1996.

Basic Cost-Benefit Texts (not required)

Boardman AE, Greenberg DH, Vining AR, Weimer DL. Cost-Benefit Analysis: Concepts and Practice. Third Edition. Pearson Education, Inc. 2006.

Other course materials will be posted throughout the semester to the course e-room on Canvas. You can access Canvas directly through the following link: <https://wharton.instructure.com>. Wharton students may also use the "My Courses" tab through the SPIKE student portal: <http://spike.wharton.upenn.edu/>.

****Non-Wharton students will need a Wharton class account in order to access Canvas.** To set up your Wharton account, please use the "Class Accounts" link here: <http://accounts.wharton.upenn.edu>. Please note that you *must be officially enrolled in the course for at least one business day* before opening a Wharton class account. Canvas access should begin working approximately 20 minutes after creating your account.

Session 1: **Introduction to Concepts (MP)**
September 6

Key Concepts

- **CEA and CBA**
- **Incremental analysis**
- **Decision analysis**
- **Value-based medicine and value-based pricing (first look)**

Drummond et al., Chapters 1-2.

Meltzer and Smith, “Theoretical Issues Relevant to the Economic Evaluation of Health Technologies,” Chapter 7 in *Handbook of Health Economics*, Vol. 2.

Garber and Sculpher, “Cost Effectiveness and Payment Policy,” Chapter 8 in *Handbook of Health Economics*, Vol. 2.

Eisenberg, “Clinical Economics: A Guide to the Economic Analysis of Clinical Practices,” *Journal of the American Medical Association* (November 24, 1989).

Stokey and Zeckhauser, A Primer for Policy Analysis, Chapter 9.

Garber, “Cost Effectiveness and Evidence Evaluations as Criteria for Coverage Policy,” *Health Affairs Web Exclusive* (May 19, 2004).

Session 2: **Welfare Economic and Other Foundations of Cost-benefit and Cost-Effectiveness Analysis (MP)**
September 13

- **Efficiency; market failure**
- **First theorem of welfare economics**
- **Private vs. social measurement of cost and benefit**
- **Equity vs. efficiency**
- **Consumers’ surplus; opportunity cost; transfer payments**
- **External effects; altruism**

Chapman RH, Neumann PJ, “Web Site Offers Comprehensive List of Cost-Utility Ratios in Health and Medicine,” Paper for *Risk in Perspective* Series of the Harvard Center of Risk Analysis, November 2000; 8(8).

Borenstein, S, “Youth Fare Better than Elderly in Bush Administration’s Cost-Benefit Analyses,” *Knight-Ridder Tribune Business News* (December 19, 2002).

Weinstein M, “From Cost-Effectiveness Ratios to Resource Allocation: Where to Draw the Line?”

Weisbrod, Test and Stein, “Alternatives to Mental Hospital Treatment,” *Arch Gen Psychiatry* (1980).

Davis MM, "Varicella Vaccine, Cost-effectiveness Analyses, and Vaccination Policy," Editorial in *JAMA* 294, no. 7 (August 17, 2005).

Session 3:
September 20

Cost Theory for Welfare Econ (MP) and CE analysis Example (DP)

Cost Theory for Welfare Econ

Key Concepts

- **Opportunity cost; sunk costs, overhead costs; marginal costs**
- **Allocation of joint and/or overhead costs**
- **Approaches to cost estimation**

Drummond et al., Chapter 4, "Cost Analysis" (pp. 69-73).

Brent. Chapter 2. "Cost minimization and the definition of 'cost'"

Brent. Chapter 3. "Types of costs and their measurement"

Brent. Chapter 4. "External cost"

CE Analysis Example

- **Read the newspaper article and the 4 CE analyses which will be critiqued in class**

Kolata G, "Aneurysm Tests Urged in Older Men Who Smoked," *New York Times*, February 1, 2005.

Lee TY et al., "The Cost-Effectiveness of a 'Quick-Screen' Program for Abdominal Aortic Aneurysms," 2002.

Frame PS, Fryback DG, and Patterson C, "Screening for Abdominal Aortic Aneurysm in Men Ages 60-80 Years: A Cost-Effectiveness Analysis," *Annals of Internal Medicine* 119, no. 5 (1993): 411-416.

Multicentre Aneurysm Screening Study Group, "Multicentre Aneurysm Screening Study (MASS): Cost Effectiveness Analysis of Screening for Abdominal Aortic Aneurysms Based on Four Year Results from Randomised Controlled Trial," *BMJ* 325 (16 November 2002).

Kim LG, et al., "A Sustained Mortality Benefit from Screening for Abdominal Aortic Aneurysm," *Annals of Internal Medicine*. 2007 May 15; 146(10):699-706.

- **These additional articles are for you to critique for your assignment.**

Ehlers et al., Analysis of cost effectiveness of screening Danish men aged 65 for abdominal aortic aneurysm" *BMJ* 2009;338:b2243.

Henriksson M and Lundgren F. "Decision-analytical model with lifetime estimation of costs and health outcomes for one-time screening for abdominal aortic aneurysm in 65-year-old men." *British Journal of Surgery* 2005; 92: 976-983.

Thompson SG. et al., “Screening men for abdominal aortic aneurysm: 10 year mortality and cost effectiveness results from the randomised Multicentre Aneurysm Screening Study.” *BMJ* 2009;338:b2307.

- **Readings to help with critiquing cost-effectiveness analyses**

Drummond et al., Chapter 3.

Drummond, Table 2, from “Allocating Resources,” *International Journal of Technology Assessment in Health Care* (1990).

Petrou S and Gray A. ‘Economic evaluation using decision analytical modelling: design, conduct, analysis, and reporting.’ *BMJ* 2011.

Session 4:
September 27

Introduction to CE Analysis and Decision Analysis (HG)

Key Concepts

- **Introduction to CE Analysis: What question does it answer?**
- **Choice criteria for CEA**
- **The cost-effectiveness frontier**
- **Net benefits and choice criteria**

Glick, Doshi, Sonnad, Polsky. Chapter 7, “Comparing Cost and Effect: Point Estimates for Cost-Effectiveness Ratios and Net Monetary Benefit,” *Economic Evaluation in Clinical Trials* (2007).

Drummond et al., Chapter 5.

Stinnett and Mullahy. “Net Health Benefits: A New Framework for the Analysis of Uncertainty in Cost-Effectiveness Analysis,” *Medical Decision Making* 18, suppl. (1998): S68-S80.

Session 5:
October 4

QALYs, QOL* and Cost-utility Approaches (HG)

Key Concepts

- **Values vs. Utilities**
- **Methods of measuring preferences (other than willingness to pay)**
- **Defining and measuring QALY weights**
- **Healthy Year Equivalents: the controversy**

*May be skipped; optional QOL readings do not appear in the coursepack but are posted on Canvas.

*Guyatt, Feeny and Patrick, "Measuring Health-related Quality of Life," *Annals of Internal Medicine* 118 (1993): 622-629.

*Fitzpatrick, Fletcher, Gore, Jones, Spiegelhalter and Cox, "Quality of Life Measures in Health Care I: Applications and Issues in Assessment," *British Medical Journal* 305 (1992): 1074-1077.

*Fletcher, Gore, Jones, Fitzpatrick, Spiegelhalter and Cox, "Quality of Life Measures in Health Care II: Design Analysis and Interpretation," *British Medical Journal* 305 (1992): 1145-1146.

Medical Outcomes Trust, "Scientific Advisory Committee Instrument Review Criteria," *Medical Outcomes Trust Bulletin* (September 1995): I-IV.

Glick, Doshi, Sonnad, Polsky, Chapter 4, "Assessing Quality-Adjusted Life Years," *Economic Evaluation in Clinical Trials*, 2007.

McNeil et al., "Speech and Survival: Tradeoffs between Quantity and Quality of Life with Laryngeal Cancer," *New England Journal of Medicine* (1981).

Nord, Richardson, and Macarounas-Kirchmann, "Social Evaluation of Health Care versus Personal Evaluation of Health States," *International Journal of Technology Assessment in Health Care* (1993): 463-478.

Bala MV, Zarkin G, "Are QALY's an Appropriate Measure for Valuing Morbidity in Acute Diseases?" *Health Economics* (March 2000).

Loomes and McKenzie, "The Use of QALYs in Health Care Decisionmaking," *Social Science and Medicine* (1989).

Keeney and Raiffa, *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*, Chapters 3 and 5.

Session 6: **QALYs, QOL* and Cost-utility Approaches II (HG); Statistical Issues in CEA and CBA I (HG)**
October 11

SHORT PAPER DUE

QALYs, QOL and Cost-utility Approaches: Finish readings from Session 5

Statistical Issues in CEA and CBA

Key Concepts

- **Implementation**
- **Analysis**

*May be skipped; optional QOL readings do not appear in the coursepack but are posted on Canvas.

- **Validity**

Thompson S, Barber J, “How Should Cost Data in Pragmatic Randomised Trials Be Analysed,” *BMJ* 320 (2000): 1197-1200.

Glick, Doshi, Sonnad, Polsky, Chapter 8, "Understanding Sampling Uncertainty: The Concepts," *Economic Evaluation in Clinical Trials* (2007).

Glick, Doshi, Sonnad, Polsky, Chapter 9, "Sampling Uncertainty: Calculation, Sample Size and Power, and Decision Criteria," *Economic Evaluation in Clinical Trials* (2007).

Session 7:
October 18 **Statistical Issues in CEA and CBA II (HG)**

Session 8:
October 25 **Practical Costing (HG) and Discounting (DP)**

Key Concepts

- **Approaches to cost estimation**
- **Discounting**

Glick, Doshi, Sonnad, Polsky, Chapter 3, "Valuing Medical Service Use," *Economic Evaluation in Clinical Trials*, Forthcoming.

Clement FM., et al., The Impact of Using Different Costing Methods on the Results of an Economic Evaluation of Cardiac Care: Microcosting vs. Cross-costing Approaches. *Health Economics* 18: 377-388 (2009)

Keeler and Cretin, “Discounting of Lifesaving and Other Interventions,” *Management Science* (1983): 300-306.

Session 9:
November 1 **Measuring Benefits in Money (DP)**

Key Concepts

- **Approaches to valuing health in monetary terms (Ch. 7 / Ch 11)**
- **Human Capital (Linnerooth)**
- **Revealed prices in market (Viscusi)**
- **Direct measures / contingent valuation (O’Brien, Brent, Ch 12, and Klose)**

Drummond et al., Chapter 7, “Cost-benefit Analysis.”

Brent. Chapter 11. “Cost-benefit Analysis and the Human Capital Approach.”

Linnerooth, “The Value of Human Life: a Review of the Models,” *Economic Inquiry* (1979).

Viscusi WK and Aldy JE, "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," *Journal of Risk and Uncertainty* 27, no. 1 (August 2003): 5-76.

Hammit JK and Treich N. "Statistical Vs. Identified Lives in Benefit-Cost Analysis." *J Risk Uncertainty* (2007) 35:45–66.

O'Brien B, Gafni A, "When Do the 'Dollars' Make Sense? Toward a Conceptual Framework for Contingent Valuation Studies in Health Care," *Medical Decision Making* 16 (1996): 288-299.

Klose, T, "The Contingent Valuation Method in Health Care," *Health Policy* 47 (1999) 97-123.

Brent. Chapter 12. "Cost Benefit Analysis and Willingness to Pay."

Reed Johnson F. et al., "How Does Cost Matter in Healthcare Discrete-Choice Experiments?" *Health Economics* 20: 323-330 (2011).

Jonas DE. et al., "Willingness-to-pay to Avoid the Time Spent and Discomfort Associated with Screening Colonoscopy." *Health Economics* 19:1193-1211 (2010).

Smith RD. Sach TH. "Contingent Valuation: (Still) on the Road to Nowhere?" *Health Economics* 18 (2009):863-866.

Session 10:
November 8

Can CB and CE be Linked (DP)

Key Concepts

- Economic Foundations of CEA (Garber, Garber and Phelps, Meltzer)
- Debate: CEA vs. CBA (Lee, and Brouwer)

Garber AM, "Advances in Cost-Effectiveness Analysis of Health Interventions," *Handbook of Health Economics*, Vol. 1A, Chapter 4. (Focus on pages 198-204.)

Garber and Phelps, "Economic Foundations of Cost-effectiveness Analysis," *Journal of Health Economics* (1997): 1-32.

Meltzer, "Accounting for Future Cost in Medical Cost-Effectiveness Analysis," *Journal of Health Economics* (1997): 33-64.

Lee RH. "Future costs in cost effectiveness analysis." *Journal of Health Economics* 27 (2008): 809-818.

Brouwer WF, Koopmanschap M, "On the Economic Foundation of CEA: Ladies and Gentlemen, Take your Positions," *Journal of Health Economics* (July 2000).

Session 11: **The Cost Effectiveness Threshold and Willingness to Pay for a QALY (DP)**
November 15

QUIZ

Johannesson M, Meltzer D, “Some Reflections on Cost-Effectiveness Analysis,” *Health Economics* 7 (1998): 1-7.

Hirth RA, Chernew ME, Miller E, Fendrick M, Weissert WG, “Willingness to Pay for a Quality-Adjusted Life Year: In Search of a Standard,” *Medical Decision Making* 20, no. 3 (July-Sep. 2000): 332-342.

Braithwaite RS, et al., “What Does the Value of Modern Medicine Say About the \$50,000 per Quality-Adjusted Life-Year Decision Rule?” *Medical Care* 46(4), April 2008, pp 349-356.

Mason H, Jones-Lee M, and Donaldson C. “Modelling the Monetary Value of a QALY: A New Approach Based on UK Data.” *Health Economics* 18:933-950 (2009).

Bobinac A, et al., “Willingness to Pay for a Quality-Adjusted Life-Year: The Individual Perspective.” *Value in Health* 13(8) (2010).

Session 12: **Policy Uses of CB/CE Analysis and Value-based Insurance (MP)**
November 29

Pauly, “Cost Effectiveness Analysis and the Design of Cost-sharing in Insurance: Solving a Puzzle,” (forthcoming).

Meltzer and Smith, “Theoretical Issues Relevant to the Economic Evaluation of Health Technologies,” Chapter 7 in *Handbook of Health Economics*, Vol. 2. (See also Sept. 6.)

Garber and Sculpher, “Cost Effectiveness and Payment Policy,” Chapter 8 in *Handbook of Health Economics*, Vol. 2. (See also Sept. 6.)

Basu, A. (2011), “Economics of individualization in comparative effectiveness research and a basis for a patient-centered healthcare. *Journal of Health Economics* 30(3): 549-559.

Session 13: **Student Presentations**
December 6