

**THE WHARTON SCHOOL
University of Pennsylvania**

**COST-BENEFIT AND COST-EFFECTIVENESS ANALYSIS
HCMG 901/301
Fall 2015
Thursdays 4:30-7:30
SHDH 116**

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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 5:45. 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 1** (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 5.**

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 22.** The term project will be presented orally, with written supplementation such as the power point presentation (40%) on the last day of class: **December 3.**

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: <https://canvas.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 (HG)**
August 27

Key Concepts

- **CBA, CEA and other types of analysis**
- **Cost and effect measures**
- **Decision rules**
- **Users of CBA/CEA**

Drummond et al., Chapters 1-2.

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 (HG)**
September 3

- **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: **Introduction to CE Analysis and Decision Analysis (HG)**
September 10

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 4: **Discounting (DP) + AAA Example (DP)**
September 17

Key Concept

- **Discounting**

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

CE Analysis Example AAA

- **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 modeling: design, conduct, analysis, and reporting.’ *BMJ* 2011.

Session 5:
September 24

Economic Theories of Cost (DP)

Key Concepts

- **Cost theory for welfare economics**
 - **Opportunity cost; sunk costs, overhead costs; marginal costs**
 - **Allocation of joint and/or overhead costs**
- **Approaches to cost estimation**
- **Prices as costs**
 - **Endogenous market responses to regulation**

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

Brent, Chapter 2, “Cost minimization and the definition of ‘cost’”; Chapter 3, “Types of costs and their measurement”; Chapter 4, “External cost”.

Jena, A. B. and T. J. Philipson, “Endogenous Cost-Effectiveness Analysis and Health Care Technology Adoption,” *Journal of Health Economics* 32(2013) 172-180.

Session 6:

Practical Costing (HG) + QALYs and Cost-utility Approaches (HG)

October 1

SHORT PAPER DUE

Key Concept

- **Approaches to cost estimation**

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)

Key Concepts, QALYs

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

*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).

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).

(FALL BREAK – NO CLASS ON OCT 8)

Session 7: **QALYs II (HG) and Statistical issues in CEA and CBA (HG)**

October 15

QALYs and Cost-utility Approaches: Finish readings from Session 6

Key Concepts, Statistical Issues

- **Implementation**
- **Analysis**
- **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 8:
October 22

Statistical Issues (II) (HG)

Statistical issues: Finish readings from Session 7

Session 9:
October 29

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.

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 5

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:
November 12

The Cost Effectiveness Threshold and Willingness to Pay for a QALY (DP)

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 11: **Economics of Treatment Choice and Implications for Cost-Effectiveness Policy (AS)**
November 17 (Tuesday)

Key Concepts

- **Treatment choice in practice**
- **Variation in value and/or effectiveness**
 - **Focus: cost-sharing**
 - **Focus: personalized medicine**

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

Chandra, A. and J. Skinner (2012), “Technology Growth and Expenditure Growth in Health Care,” *Journal of Economic Literature* 50(3), 645-680.

Conti, R., et al. (2010), “Personalized Medicine and Genomics: Challenges and Opportunities in Assessing Effectiveness, Cost-Effectiveness, and Future Research Opportunities,” *Med Decis Making* 30: 328-340.

Einav L. Finkelstein A. Williams H. (2014), “Paying on the Margin for Medical Care: Evidence from Breast Cancer Treatments.” NBER Working Paper 20226
<http://www.nber.org/papers/w20226.pdf>,

Session 12: **Project Meetings**
November 24 (Tuesday)

Session 14: **Student Presentations**
December 3