Public Expenditure Analysis
90-774/90-474

Heinz College, Carnegie Mellon University

Spring, 2021

Revised November 26, 2021

Remote via Zoom

MW 1:30-2:50 PM and
Occasionally (3) F: Time TBA (likely 11:30AM -12:50PM)
Spring, 2021

Professor Robert P. Strauss
Office Hours: MW 3:00-5:00PM
and by appointment

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Public Expenditure Analysis is a 12 unit course designed to deal with the expenditure side of the public sector budget in a series of modules. It has been conceptualized as a blending of private finance and public expenditure principles. The former provides a systematic framework, capital budgeting, for the evaluation of private-sector capital projects, while the latter builds on the former, and introduces issues of externality, the social rate of discount, and incomplete markets through the mechanism of shadow pricing. Public Expenditure Analysis prepares those Heinz and other CMU students seeking careers in the public sector, or those parts of the private sector that routinely deal with the public sector's capital budgeting decisions. It answers the question "when should a community build a bridge?"

Public Expenditure Analysis is divided into 4 modules. In Module 1, the course develops the essential techniques of private sector evaluation principles for short-term and long-term capital projects. In Module 2, special problems which arise in the evaluation of public sector capital projects are discussed; a variety of evaluation techniques and applications especially suited to public sector projects are then examined. In Module 3, actual cost-benefit studies in the policy areas of education, environment, health, criminal justice, transportation and recreation are examined. In Module 4, evaluation at a high level of aggregation is dealt with through the use of generational accounting models. These models are examples of *aggregate* long and short-term public evaluation problem areas typically dealt with by national governments. Also in Module 4 groups of students perform and report a critical review of a cost-benefit study they have chosen. Throughout the course, similarities and differences between the public sector and private sector are emphasized, and examples from the real world are discussed in class.

The course presumes that the student has had courses in microeconomics and economic statistics, owns a calculator capable of doing $x^{a/b}$ or $x^{1.361}$, and is familiar with the use of spreadsheet packages on a personal computer. Students may also find the HP10BII Financial calculator (used in **RWJ** below) to be particularly convenient to use in class, along with Excel, and various standard tables. The HP calculator now lists for $19.83 on Amazon.[2] Students are expected to bring their calculator to each class session, and perform calculations in conjunction with class activities.

There are two required, somewhat expensive but worthwhile texts for the course, and students are expected to bring the textbook to class that pertains to that portion of the course. Please be sure that you obtain the proper (8^{th}) edition and exact ISBN of Ross, Westerfield and Jaffe (about $65) to save you a lot of money.

1. Private sector evaluation principles are found in Ross, Westerfield, and Jaffe *Corporate Finance, Eighth Edition, 2008*. (McGraw-Hill Publishing ISBN 0-07-333718-0). Required reading is denoted as **RWJ** below. .Amazon Link:https://www.amazon.com/Corporate-Finance-8th-Stephen-Ross/dp/0073337188/ref=sr_1_6?dchild=1&keywords=corporate+finance+ross+westerfield+jaffe+8th+edition&qid=1606306041&sr=8-6

2. Public Sector principles of evaluation are contained in *Cost-Benefit Analysis: Concepts and Practice Fifth Edition (2018). (*ISBN 978-1-108-40129-6: Paperback Cambridge University Press), by A.E. Boardman, D.H. Greenberg, A.R. Vining, and D.L. Weimer Chapters from the text (denoted **CBA** below) are required reading.
   Amazon Link: https://www.amazon.com/Cost-Benefit-Analysis-Concepts-Anthony-Boardman-dp-1108401295/dp/1108401295/ref=dp_ob_image_bk $64.84 Please be sure that you obtain the Cambridge University Press version of this book with the exact ISBN, because they changed publishers from Pearson to Cambridge, and the Cambridge version is the textbook for this course..

   Some additional applications of Public Expenditure Analysis beyond those in **CBA** for Module 3 of the course will be available online on Canvas.

In addition, it is strongly recommended that you subscribe to *The Wall Street Journal* in order to keep abreast of fiscal and financial events in the private and public sectors. Please note that *The Wall Street Journal* is available free online through the Carnegie Mellon library portal.

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[1] For example, the Casio fx 260 SolarII-S-I-H is a nice little, affordable calculator; it lists for about $8.47 at Amazon. https://www.amazon.com/Casio-Scientific-Calculator-FX-260-SOLARII-S-IH/dp/B071R3H9WB/ref=sr_1_7?dchild=1&keywords=Casio+fx-300H&qid=1606392500&sr=8-7

[2] https://www.amazon.com/Sms-HP-10BIIPLUS-B12-Calculatrice-financi%C3%A8re/dp/B004N76618/ref=sr_1_3?dchild=1&keywords=HP10BII&qid=1606305887&sr=8-3

Evaluation will be based on performance in 5 problem sets, a group project and presentation due at the end of the course, a 1.5 hour midterm exam (March 15), and 3 hour final exam (May 10), and classroom performance. Problem sets are to be handed in via email to me, worked on **separately and independently** by each student. They must be word processed, explained in words, symbols and numbers; and any spreadsheet analysis must display formulas.

Grading of problem sets and exams are performed by Professor Strauss.

The weights for grading are:

- 5 Problem sets 20% (4% for each problem set)

Problem set 1: Accounting Statements, Cash Flow, Discounting Formulae [130] #1 Out: 2/8/20 Due: 2/17/20
Problem set 2: Valuing Stocks & Bonds, Alternative Investment Rules [100] #2 Out: 2/8/20 Due: 2/27/20
Problem set 3: Capital Budgeting and Net Present Value Analysis [60] #3 Out: 2/27/20 Due: 2/12/20
Problem set 4: Using CBA 1 [100] + 10 bonus #4 Out: 3/12/20 Due: 4/5/20
Problem set 5: Using CBA 2 [100] #5 Out: 4/5/20 Due: 4/16/20

The weights for various forms of evaluation are as follows.

- Group Cost-Benefit Project 15% (requires presentation and paper)
- Midterm exam 30% (10 essay questions
- Final exam 30% (15 essay questions)
- Class participation 5% (answers/participation in class about session readings and material)

Final points in the course are then calculated as the sum of the weighted scores. The grading scale for the course is:

< 49.9%	R
50.0%-54.9%	D
55.0%-59.9%	D+
60.0% - 64.9%	C-
65.0% - 69.9%	C
70.0%-74.9%	C+
75.0% - 79.9%	B-
80.0%-84.9%	B
85.0% - 89.9%	B+
90.0%-94.9%	A-
95.0% - 100.0%	A

Plus and minus grades are distributed within the above ranges, and ordinary numeric rounding rules are in effect.

To pass the course on a pass-fail basis requires a 70% or above which is based on performance in the problem sets and exams.

The Group Cost-Benefit Project works as follows.

Each group typically consists of 3 students who choose each other and propose a project Abstract (1 page) to Professor Strauss on or before March 10; upon his approval the project begins. There is a presumption that one student will specialize on benefit estimation, one student will specialize on costs estimation, and one will synthesize the costs and benefits using alternative assumptions. Examples of prior project presentations (essentially the power points) and final reports will be on Canvas under *Project Review Materials*.

A group project is the cost-benefit analysis derived or based on an earlier cost-benefit analysis performed on a public policy initiative, typically, but not always a public capital project. Engineering studies are a common source as are "evaluations" performed by consultants, often accounting firms. The purpose of doing this is to bring together the technical discounting skills developed in the first part of the course, the conceptualization of public cost benefit analysis from the second part of the course and the "plug-ins" available from the CBA textbook, experience and knowledge gained from doing course problem sets, and the demonstration of professional presentation and writing skills. The project thus is intended to tie the course together for each student by "doing it." The project will be presented to the class on May 3, 2020, and a written Final Report is due on or before the Final Exam, May 10. Typically, project presentations last 20 to 30 minutes. Former students of PEA and occasionally interested faculty with expertise are invited to attend in person and virtually, and invited to participate in audience commentaries on the veracity of estimated benefits and costs. Historically, face-to-face presentations have been accompanied by pizza and various liquid refreshments including those which are age-determined. Whether all of this can be accomplished in a virtual, remote environment is a problem which Professor Strauss is actively working on.

Prior course projects have looked at: subways in New York City, the various sports stadiums in Pittsburgh, the tunnel to the North Side, maglev to the Pittsburgh International Airport, Boston's Big Dig, the Heinz School's 1 year masters program (M3), highway extensions from Denver to the mountains, the DC stadium, the Texas superhighway project, light rails in Seattle and Minneapolis, the No Child Left Behind federal education reform, the Emsworth lock and dam in Pittsburgh, the Central Arizona Water Project, the Pittsburgh Promise, a retrospective on the construction of the Pittsburgh International Airport, a retrospective on the construction of the Penguins new stadium, a retrospective on the Pittsburgh convention center, high a speed highway project in Turkey, a subway in Santo Domingo, high speed rail in China, a DUI initiative for Pennsylvania, and establishment of tele-medicine for SW Pa. hospitals. Each group is encouraged to find a new project for which there is some sort of *ex ante* evaluation with data that can be reanalyzed with more realistic assumptions about discount rate, benefits, costs and dead weight loss.

We will utilize Canvas for as many course management purposes as possible. Within Canvas, the course syllabus (and its updates) can be found under *Syllabus*; problem sets can be found under *Assignments*; lecture notes, RWJ and CBA power point presentations can be found for each meeting session under *Modules.* Solved problems from **RJW** will also be on Canvas in a Module entitled Solved Problem Sets.

Due to the Pandemic, the course will be taught using Zoom and its recording facility. I am available to meet with you after class Monday and Wednesday from 3 to 5 pm and by appointment via Zoom as well. You may wish to communicate with me via electronic mail (rpstrauss@gmail.com) as I am usually logged in from somewhere in the world and am responsive.

The Course Calendar and Activities are:

Lecture/Session	Date	Topic	Problems	Required Reading
1	Feb 1 (M)	Course Overview		Bring books/calculator
2	Feb 3 (W)	Overview of CBA		**CBA** 1
No class	Feb 5 (F)			
3	Feb 8 (M)	Corporate Finance & Accounting Statements	#1 Out	**RWJ** 1-2
4	Feb 10 (W)	Accounting Statements & Financial Planning		**RWJ** 2- 3
No class	Feb 12 (F)			
5	Feb 15 (M)	Net Present Value 1		
6	Feb 17 (W)	Net Present Value 2	#1 Due #2 Out	**RWJ** 4
No class	Feb 19 (F)			
7	Feb 22 (M)	Valuing Debt & Equity I		**RWJ** 5
8	Feb 24 (W)	Valuing Debt & Equity II		**RWJ** 5
9	Feb 27 (F)	Alternative Investment Rules	#2 Due #3 Out	**RWJ** 6
10	Mar 1 (M)	NPV / Capital Budgeting 1		**RWJ** 7

Lecture/Session	Date	Topic	Problems	Required Reading
11	Mar 3 (W)	Capital Budgeting 2		**RWJ** 7,8
12	Mar 5 (F)	Capital Budgeting & Strategy		**RWJ** 8
13	Mar 8 (M)	Long-Term Debt, Sinking Funds		**RWJ** 14,20
14	Mar 10 (W)	Cash Management, Lease vs. Buy	**Project Abstract Due for Review**	**RWJ** 27, **RWJ** 21
15	Mar 12 (F)	**REVIEW**	#3 Due # 4 Out	
16	Mar 15 (M)	**MIDTERM EXAM**		
	Mar 17 (W)	Conceptual Foundations of CBA		**CBA** 2
No class	Mar 19 (F)			
17	Mar 22 (M)	Micro Foundations of CBA		**CBA** 3
18	Mar 24 (W)	Valuing Impacts with Demand Curves		**CBA** 4
19	Mar 29 (M)	Valuing Impacts in Output Markets		**CBA** 5
20	Mar 31 (W)	Valuing Impacts in Factor Markets		**CBA** 6
21	Apr 2 (F)	Valuing Impacts in Secondary Markets		**CBA** 7
22	Apr 5 (M)	Valuing Impacts using Indirect Methods	#4 Due #5 Out	**CBA** 15
23	Apr 7 (W)	Constructing Shadow Prices		**CBA** 17
No class	Apr 9(F)			
24	Apr 6 (M)	Risk and Uncertainty		**CBA** 12
25	Apr 8 (W)	Uncertainty and Social Discount rate		**CBA** 12, 10
No class	Apr 10 (F)			
26	Apr 12 (M)	Option Value &Existence Value		**CBA 12** **CBA** 13
27	Apr 14 (W)	CE and Distribution		**CBA** 18, 19
No class	Apr 16 (F)	Carnival (Really?)	#5 Due	
28	Apr 19 (M) meet at noon	Micro CBA: Education; Sports Stadiums		Cohn 3,4,5 Noll Chapters 1- 2, Baade , 3.
29	Apr 21 (W)	Micro CBA: Crime		Levitt,
No class	Apr 23 (F)			
	Apr 26 (M)	Micro CBA: Elderly Driving, Environmental Issues		Williams and Graham, Gray & Graham; Nichols,Augustyniak
31	Apr 28 (W)	Macro CBA: Generational Analysis 1&2		Kotliakoff 5-7
32	May 3 (M)	**Group Presentations**		
33	May 5 (W)	**Review**		
No class	May 7 (F)			
34	May 10 (M)	**FINAL EXAM (Final Report Due) TBA**		

Bibliography (in alphabetical order)

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