



**USAID**  
FROM THE AMERICAN PEOPLE

---

## **Fiscal Reform and Economic Governance**

**and**



***Duke University***  
*Duke Center for International Development*



**present**

***A Training Program in***

**Applied Cost-Benefit and  
Cost-Effectiveness Analysis**

**June 28 – July 23, 2010**

**DUKE UNIVERSITY**  
**Duke Center for International Development (DCID)**  
**Sanford School of Public Policy**

**Summer 2010**  
June 28<sup>th</sup> to July 23<sup>rd</sup>

**Executive Development Program**

*for*

USAID Officers

## **Applied Cost-Benefit and Cost-Effectiveness Analysis**

### **Introduction**

Using practical case studies, the four-week intensive Executive Development Program presents the basic principles of Applied Cost-benefit Analysis (CBA) and Cost-Effectiveness Analysis (CEA) with an integrated analytic framework.

### **Key idea**

The key idea is that judicious selection of investment projects at the micro level, with recognition of resource constraints and complementary involvement of the private sector, will lead to sustained economic growth, equitable development, poverty reduction and private sector growth.

### **Integrated framework for Applied CBA and CEA (project appraisal)**

An integrated framework for project appraisal consists of three main components: financial analysis, economic analysis and distributive analysis. In addition, the framework includes sensitivity analysis and risk analysis.

The lecture topics include:

- ✚ An integrated approach to project appraisal: Baku textile project
- ✚ Alternative points of view and investment criteria
- ✚ Principles of financial analysis and constructing cash flows
- ✚ Financial and economic analysis
- ✚ Distributive analysis: Harberger's basic needs approach
- ✚ Risk management

### **Content**

The Program is designed for an audience with a wide range of backgrounds, and provides rich, stimulating and challenging opportunities for the participants to engage with the fundamental concepts in applied CBA and CEA.

The diversity of the participants' backgrounds will be a particular strength in assessing the merits of projects from a wide range of perspectives.

### **Case studies**

The coverage of the case studies includes the following important sectors: transport, water and sanitation, agriculture, agribusiness, health and education. Most of the case studies are from the Kennedy School of Government, Harvard University.

The instructors will also work with USAID counterparts to develop appropriate case studies reflecting the Agency's priority areas.

### **Individual and group case studies**

**Participants are requested to bring a case study for analysis.** Two or three participants may work together on one case study. During the course of the workshop, the teaching team will work with the participants on the completion of the case studies. As the participants learn the concepts of CBA and CEA, they will apply the concepts to the case studies.

### **Approach**

The Program uses case studies, classroom presentations and discussions, debates and role playing to understand and appreciate the multi-faceted dimensions of cost-benefit analysis.

Using spreadsheet models, participants will analyze the case studies, and test and support the policy implications of their recommendations and assessments.

### **Target audience**

The target audience consists of USAID officers who require knowledge of the key principles of applied CBA and CEA for decision-making.

It will be particularly relevant and useful for USAID officers who may not have an extensive academic education in economics or finance.

The principles of applied CBA and CEA are important for assessing projects that are in the public sector, and projects that may require private sector participation, such as Public Private Partnerships (PPPs).

### **Objectives of the program**

After the successful completion of the program, participants will achieve the following objectives:

- Appreciate the relevance of CBA and CEA for assessing public investment projects across various sectors;
- Know the components of an integrated framework for applied CBA and CEA;
- Appreciate the relevance of CBA and CEA for enhancing private sector development;
- Understand the key concepts in CBA and CEA;
- Be able to write Scope of Work (SOWs) for consultants who provide project appraisal services;
- Be able to supervise and guide consultants who provide project appraisal reports;
- Be able to interpret and assess the results of CBA and CEA;

- Be able to use such cost-benefit analyses to select projects that enhance economic growth and reduce poverty; and,
- Be able to produce analyses using cost-effectiveness and least-cost techniques;
- Clearly communicate the relevance of the results to interested parties and decision-makers.

### **List of potential cases from Harvard University**

Nghe An Tate & Lyle Sugar company (Vietnam), Harvard Business School, 2002, Case #: 9-202-054

Rural electrification in Nicaragua, Kennedy School of Government, Harvard University, 2003, Case #: CR14-03-1705.0

The Hong Kong-Macau-Zhuhai Bridge Proposal, Kennedy School of Government, Harvard University, 2003, Case #: C14-03-1700.0

Maribor, Slovenia: Wastewater treatment privatization, Kennedy School of Government, Harvard University, 2001, Case #: CR14-01-1620.0

Leasing the Pennsylvania turnpike, Kennedy School of Government, Harvard University, 2007, Case #: CR14-07-1878.0

### **Other case studies**

- Baku textile project
- Mauritania water supply

### **Case studies to be developed in collaboration with USAID**

- ✓ Food security
- ✓ Climate change
- ✓ Policy reform

### **Final presentations by the participants**

On the last day of the Program, the participants will make group presentations on the selected case studies, using the knowledge that they have acquired in the Program.

Participants may bring their own projects for analysis or they may select a project in consultation with the Teaching Team of the Program.

### **Structure of a typical day**

A typical day consists of five main sessions as follows:

First session: 9.00 a.m. to 10.30 a.m.

Break: 10.30 a.m. to 10.45 a.m.

Second session: 10.45 a.m. to 12.15 p.m.

Lunch: 12.15 p.m. to 1.00 p.m.

Third session: 1.00 p.m. to 2.30 p.m.

Break: 2.30 p.m. to 2.45 p.m.

Fourth session in computer lab: 2.45 p.m. to 4.15 p.m.

Break: 4.15 p.m. to 4.30 p.m.

Fifth session, Discussion group: 4.30 p.m. to 5.30 p.m.

### **Main material for the course**

The main material for the course is the Practitioners' Appraisal Guidebook that was developed by USAID in the India State Fiscal Management Reform Project. See website link below.

[http://www.fiscalreform.net/index.php?option=com\\_content&task=view&id=890&Itemid=52](http://www.fiscalreform.net/index.php?option=com_content&task=view&id=890&Itemid=52)

### **Additional resources**

Also see the additional related resources and materials on cost-benefit analysis on USAID/EGAT's fiscalreform.net website.

[http://www.fiscalreform.net/index.php?option=com\\_content&task=section&id=14&Itemid=145](http://www.fiscalreform.net/index.php?option=com_content&task=section&id=14&Itemid=145)

### **Expectations**

We expect that the participants will read the relevant materials and be actively involved in the daily discussions on the case studies.

### **Prerequisites**

Applied CBA and CEA is an interdisciplinary subject. Participants with the following prerequisites will derive the most value from the program.

- **Experience with decision making with respect to projects:** Participants are familiar with project reports.
- **Spreadsheet competency:** Participants should be able to manipulate a simple model in EXCEL (200 lines) and conduct one-way and two-way sensitivity analysis.
- **Applied welfare economics:** Introductory principles of applied welfare economics, e.g., consumer surplus, producer surplus.
- **Basic statistical knowledge:** Introductory course in statistics and probability theory.
- **Basic concepts in accounting and finance:** Introductory course in accounting and finance.

## **WEEK ONE: DAY ONE**

### **Session One: introduction and overview**

In this session, we present an overview of the structure and content of the workshop. In particular, we discuss the expectations for the major case study that **all** participants must successfully complete.

### **Session Two: integrated approach to project appraisal, the Baku textile project**

In this session, we present an integrated approach to project appraisal: financial analysis, economic analysis and distributive analysis. Also, we discuss the relevance of sensitivity analysis, scenario analysis and risk analysis.

**Session Three: alternative points of view**

In this session, we examine the importance of analyzing projects from the perspectives of the key stakeholders.

**Session Four: Selection of case studies**

In this session, we will meet with the participants to select the case studies that they will work on during the Program.

**Session Five: introduction to EXCEL modeling**

In this session, we provide an introduction to the basic concepts and ideas for modeling in EXCEL. In addition, we cover the basic ideas on the time value of money.

**WEEK ONE: DAY TWO****Session One: constructing financial cash flows**

In this session, we introduce the basic principles for constructing financial cash flows.

**Session Two: cost-effectiveness principles**

This session presents the basic principles of cost-effectiveness analysis.

**Session Three: cost-effectiveness principles (continued)**

This session is a continuation of the previous session on cost-effectiveness.

**Session Four: sensitivity analysis with EXCEL**

In this session, we demonstrate the construction of preliminary tables and the use of sensitivity analysis in EXCEL by conducting one-way and two-way tables.

**Session Five: opening reception****WEEK ONE: DAY THREE****Session One: constructing financial cash flows**

This session is a continuation of the previous session on constructing financial cash flows.

**Session Two: investment criteria**

In this session, we present the concepts on time value of money (TVM), and assess the strengths and weaknesses of the common investment criteria: Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and payback period.

**Session Three: applied welfare economics: demand, supply and market equilibrium**

In this session, we introduce the basic principles of demand, supply and market equilibrium, and show how these concepts are relevant for measuring the economic benefits and costs of projects.

**Sessions Four: applied case study in computer lab: Vietnam sugar project**

In this session, participants will apply the knowledge and skills on the Vietnam sugar project. Using an EXCEL template, they will reconstruct the relevant cash flow tables.

### **Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (financial analysis).

## **WEEK ONE: DAY FOUR**

### **Session One: impacts of inflation**

In this session, we explain why it is important to construct cash flows in nominal terms and if appropriate, in the local currency. Also we discuss the impacts of inflation on the valuation of the cash flow profiles.

### **Session Two: modeling foreign exchange**

In this session, we present the Purchasing Power Parity (PPP) theory on foreign exchange rates, and demonstrate the modeling of the nominal and real foreign exchange profiles.

### **Session Three: applied welfare economics: consumer and producer surpluses**

In this session, we discuss the measurement of welfare with consumer and producer surpluses.

### **Session Four: applied case study in computer lab: Vietnam sugar project**

In this session, participants continue their work on the Vietnam sugar project.

### **Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (financial analysis).

## **WEEK ONE: DAY FIVE**

### **Session One: class presentation, Vietnam sugar project**

In this session, a selected participant will present the results of the analysis of the Vietnam sugar project. The class will interpret and discuss the results.

### **Session Two: introductory statistics**

In this session, we review the basic properties of statistics and probability distributions. Also, we introduce the WDI (World Development Indicators) database.

### **Session Three: applied welfare economics: controlled prices**

In this session, we analyze the welfare impacts of goods that have controlled prices.

### **Sessions Four: applied case study in computer lab: Hyderabad water project**

In these two sessions, participants will apply the knowledge and skills on the Hyderabad water project. Using an EXCEL template, they will reconstruct the relevant cash flow tables.

### **Session Five: general review, questions and answers**

In this session, we provide a general review of all the concepts that have been covered during the week. This session provides an opportunity for participants to review and discuss the materials. Members of the teaching team will be available to answer questions.

## **WEEK TWO: DAY ONE**

### **Session One: applied welfare economics: taxes and subsidies**

In this session, we analyze the welfare impacts of taxes and subsidies.

### **Session Two: Probability distributions**

In this session, we discuss the probability distributions that are relevant for risk analysis.

### **Session Three: Principles of risk analysis**

In this session, we discuss the principles of risk analysis.

### **Sessions Four: applied case study in computer lab: Hyderabad water project**

In this session, participants continue their work on the Hyderabad water project.

### **Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (economic analysis).

## **WEEK TWO: DAY TWO**

### **Session One: applied welfare economics: trade distortions**

In this session, we analyze the welfare impacts of trade distortions.

### **Sessions Two & Three: Monte Carlo simulation**

In this session, we present the basic principles of risk analysis and Monte Carlo Simulation.

### **Session Four: applied case study in computer lab: risk analysis of Vietnam sugar project**

In this session, participants will conduct the risk analysis on the Vietnam sugar project.

### **Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (economic analysis).

## **WEEK TWO: DAY THREE**

### **Session One: class presentation, Hyderabad water project**

In this session, a selected participant will present the results of the analysis of the Hyderabad water project. The class will interpret and discuss the results.

### **Session Two: Harberger's three postulates**

In this session, we discuss Harberger's framework for project appraisal with the three postulates.



**Session Three: applied case study in computer lab: risk analysis of Vietnam sugar project**

In this session, participants will conduct the risk analysis on the Vietnam sugar project.

**Sessions Four & Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (economic and risk analyses).

**WEEK TWO: DAY FOUR**

**Session One: Valuing non-traded goods**

In this session, we present the principles for valuing non-traded goods.

**Session Two: valuing traded goods**

In this session, we present the principles for valuing traded goods.

**Session Three: national parameters in project appraisal**

In this session, we discuss the role of national parameters, such as the economic opportunity cost of capital and economic opportunity cost of foreign exchange, in project appraisal.

**Session Four: applied case study in computer lab: risk analysis of Vietnam sugar project**

In this session, participants will conduct the risk analysis on the Vietnam sugar project.

**Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (risk analysis).

**WEEK TWO: DAY FIVE**

**Session One: class presentation, risk analysis of the Vietnam sugar project**

In this session, a selected participant will present the results of the risk analysis of the Vietnam sugar project. The class will interpret and discuss the results.

**Session Two: distributive analysis**

In this session, we discuss the issue of equity in project appraisal.

**Session Three: basic needs approach**

In this session, we compare and contrast the use of distributional weights with the basic needs approach.

**Session Four: general review, questions and answers**

In this session, we provide a general review of all the concepts that have been covered during the week. This session provides an opportunity for participants to review and discuss the materials. Members of the teaching team will be available to answer questions.

### **Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (distributive analysis)

### **WEEK THREE: DAY ONE**

#### **Sessions One & Two: preliminary presentation of group projects**

In these two sessions, the groups will present their preliminary analysis on the case studies. The feedback from the participants will help the groups to improve their analysis.

#### **Sessions Three & Four: case study one on health project using cost-effectiveness**

In these sessions, we present case studies on health projects.

#### **Session Five: preliminary presentation of group projects**

In this session, the groups will present their preliminary analysis on the case studies. The feedback from the participants will help the groups to improve their analysis.

### **WEEK THREE: DAY TWO**

#### **Sessions One & Two: case study one on health project using cost-effectiveness**

In these two sessions, we present a second case study on the use of cost-effectiveness in health projects.

#### **Session Three: case study on poverty alleviation**

In this session, we present a case study on poverty alleviation.

#### **Session Four & Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies (distributive analysis),

### **WEEK THREE: DAY THREE**

#### **Sessions One & Two: environmental impacts**

In these three sessions, Professor Kramer, from the Nicholas School of the Environment at Duke University, will use case studies to discuss the techniques for valuing environmental impacts, and their relevance to project appraisal.

#### **Session Three: case study on poverty alleviation**

In this session, we continue the discussion on poverty alleviation.

#### **Sessions Four & Five: case studies on education projects**

In these sessions, we present case studies on education projects.

### **WEEK THREE: DAY FOUR**

#### **Sessions One & Two: case studies on agribusiness development**

In these sessions, we present case studies on agribusiness development.

**Sessions Three & Four: irrigation project**

In this session, we present a case study on irrigation.

**Session Five: Group meetings and discussion on case studies**

In this session, the groups will meet with the Teaching Fellows and discuss their progress on the case studies.

**WEEK THREE: DAY FIVE**

**Sessions One & Two: case study on infrastructure project, rural electricity**

In these sessions, we present a case study on rural electricity.

**Sessions Three & Four: private sector development**

In these sessions, we present a case study on private sector development

**Session Five: general review, questions and answers**

In this session, we provide a general review of all the concepts that have been covered during the week. This session provides an opportunity for participants to review and discuss the materials. Members of the teaching team will be available to answer questions.

**WEEK FOUR: DAY ONE**

**Sessions One & Two: Public accountability in project appraisal**

In this session, we discuss public accountability in project appraisal, especially for big public sector projects.

**Sessions Three & Four: review for Quiz**

In these two sessions, we provide reviews of the materials, in preparation for the Quiz.

**Session Five: preparation for Quiz**

Participants can use this time to prepare for the Quiz. Members of the teaching team will be available to provide assistance and answer questions.

**WEEK FOUR: DAY TWO**

**Session One: preparation for Quiz**

Participants can use this time to prepare for the Quiz. Members of the Teaching Team will be available to provide assistance and answer questions.

**Session Two: Quiz**

**Session Three: preparation for final group presentations**

Members of the Teaching Team will assist the group with the completion of the major case studies.

**Session Four: Guest lecturer (TBD)**

What are the principles for giving grants?

**Session Five: preparation for final group presentations**

Members of the Teaching Team will assist the group with the completion of the major case studies.

**WEEK FOUR: DAY THREE**

**Session One: preparation for final group presentations**

Members of the Teaching Team will assist the group with the completion of the major case studies.

**Session Two: Guest lecturer**

Topic to be determined.

**Session Three: Guest lecturer**

Topic to be determined.

**Session Four: Guest lecturer**

Topic to be determined.

**Session Five: preparation for final group presentations**

Members of the Teaching Team will assist the group with the completion of the major case studies.

**WEEK FOUR: DAY FOUR**

**Sessions One to Five: final group presentations**

The groups will present the results of their analyses of the major case studies.

**WEEK FOUR: DAY FIVE**

**Session One: discussion: what are the lessons learnt?**

In this session, we reflect on the knowledge and materials covered in the Program and discuss how we can use these ideas in improving the practice of project appraisal.

**Session Two: evaluation**

**Session Three: closing ceremony**

## Preliminary Program Schedule – Week 1

<b>WEEK 1</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>Timing</b>	28-Jun-10	29-Jun-10	30-Jun-10	01-Jul-10	02-Jul-10
9:00 AM >>10:30 AM	Introduction and overview	Constructing financial cash flows	Constructing financial cash flows	Impacts of inflation	Class presentation: Vietnam sugar project
10:30 AM >>10:45 AM					
10:45 AM >>12:15 PM	Integrated approach to project appraisal: Baku textile project	Cost-effectiveness principles	Investment criteria	Modeling foreign exchange	Introductory statistics with WDI
12:15 PM >>1:00 PM					
1:00 PM >>2:30 PM	Alternative points of view in project appraisal	Cost-effectiveness principles	Applied welfare economics: demand, supply and market equilibrium	Applied welfare economics: consumer and producer surpluses	Applied welfare economics: controlled prices
2:30 PM >>2:45 PM					
2:45 PM >>4:15 PM	Meeting: selection of case studies for final group presentations	Constructing preliminary tables and sensitivity analysis in EXCEL	Applied case study in computer lab: Vietnam sugar project	Applied case study in computer lab: Vietnam sugar project	Applied case study in computer lab: Hyderabad water project
4:15 PM >>4:30 PM					
4:30 PM >>5:30 PM	Introduction to EXCEL modeling and time value of money	Opening reception	Group meetings and discussions on case studies: financial analysis	Group meetings and discussions on case studies: financial analysis	General review: questions and answers

This document was produced for review by the United States Agency for International Development. It was prepared by DAI under USAID Contract No. GEG-I-00-04-00001-00.

## Preliminary Program Schedule – Week 2

WEEK 2	Monday	Tuesday	Wednesday	Thursday	Friday
Timing	05-Jul-10	06-Jul-10	07-Jul-10	08-Jul-10	09-Jul-10
9:00 AM >>10:30 AM	Applied welfare economics: taxes and subsidies	Applied welfare economics: trade distortions	Class presentation: Hyderabad water project	Valuing non-traded goods	Class presentation: risk analysis of Vietnam sugar project
10:30 AM >>10:45 AM					
10:45 AM >>12:15 PM	Probability distributions	Monte Carlo Simulation	Harberger's three postulates	Valuing traded goods	Distributive analysis
12:15 PM >>1:00 PM					
1:00 PM >>2:30 PM	Principles of risk analysis	Monte Carlo Simulation	Applied case study in computer lab: risk analysis of Vietnam sugar project	National parameters in project appraisal	Basic needs approach
2:30 PM >>2:45 PM					
2:45 PM >>4:15 PM	Applied case study in computer lab: Hyderabad water project	Applied case study in computer lab: Hyderabad water project	Group meetings and discussions on case studies: economic analysis	Applied case study in computer lab: risk analysis of Vietnam sugar project	General review: questions and answers
4:15 PM >>4:30 PM					
4:30 PM >>5:30 PM	Group meetings and discussions on case studies: economic analysis	Group meetings and discussions on case studies: economic analysis	Group meetings and discussions on case studies: risk analysis	Group meetings and discussions on case studies: risk analysis	Group meetings and discussions on case studies: distributive analysis

## Preliminary Program Schedule – Week 3

<b>WEEK 3</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>Timing</b>	12-Jul-10	13-Jul-10	14-Jul-10	15-Jul-10	16-Jul-10
9:00 AM >>10:30 AM	Preliminary presentation of group projects	Health case study two (Sabin)	Environmental impacts (Kramer)	Agribusiness development	Infrastructure project: rural electricity
10:30 AM >>10:45 AM					
10:45 AM >>12:15 PM	Preliminary presentation of group projects	Health case study two (Sabin)	Environmental impacts (Kramer)	Agribusiness development	Infrastructure project: rural electricity
12:15 PM >>1:00 PM					
1:00 PM >>2:30 PM	Health case study one (Sabin)	Poverty alleviation	Poverty alleviation	Irrigation project	Private sector development
2:30 PM >>2:45 PM					
2:45 PM >>4:15 PM	Health case study one (Sabin)	Group meetings and discussions on case studies: distributive analysis	Education projects	Irrigation project	Private sector development
4:15 PM >>4:30 PM					
4:30 PM >>5:30 PM	Preliminary presentation of group projects	Group meetings and discussions on case studies: distributive analysis	Education projects	Group meetings and discussions on case studies	General review: questions and answers

## Preliminary Program Schedule – Week 4

<b>WEEK 4</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>Timing</b>	19-Jul-10	20-Jul-10	21-Jul-10	22-Jul-10	23-Jul-10
9:00 AM >>10:30 AM	Public accountability in project appraisal	Preparation for Quiz	Meetings: Preparation for final group presentations	Final group presentations	Discussion: What are the lessons learnt?
10:30 AM >>10:45 AM					
10:45 AM >>12:15 PM	Public accountability in project appraisal	Quiz	Guest lecture (TBD)	Final group presentations	Evaluation
12:15 PM >>1:00 PM					
1:00 PM >>2:30 PM	Review for Quiz	Meetings: Preparation for final group presentations	Guest lecture (Conrad?)	Final group presentations	Closing ceremony
2:30 PM >>2:45 PM					
2:45 PM >>4:15 PM	Review for Quiz	Guest lecture (Rosch?)	Guest lecture (Anderson?)	Final group presentations	Return to Washington, D.C.
4:15 PM >>4:30 PM					
4:30 PM >>5:30 PM	Preparation for Quiz	Meetings: Preparation for final group presentations	Meetings: Preparation for final group presentations	Final group presentations	Return to Washington, D.C.