Project Appraisal
Module Introduction and Overview

Contents

1 Introduction

This is a module about financial and economic appraisal of projects. The project is a very specific element of the public policy and management mix. It normally consists of an investment – that is, the creation of an asset which will generate benefits, financial and non-financial over a period of more than one year. This is not universally applicable as a working definition, as 'project' is often used to describe a set of discrete activities that do not always involve a capital investment, to achieve some specific goals. In this module, however, we will be dealing with capital investments.

Financial appraisal involves predicting the financial flows, both expenditures and revenues, associated with the investment. Companies make such appraisals when choosing where and how to invest, and such financial appraisal is at the heart of the appraisal process. Economic appraisal is often used for public project appraisal because some of the relevant flows involved are not financial. The benefits of a public investment may consist, in part, of social benefits that do not have a monetary value. Some of the costs incurred, such as environmental impact of an infrastructure investment, may also have no market value. The normal approach with such non-financial flows is to find ways of measuring the costs and benefits and attributing a monetary value to them.

How do these two sorts of appraisal fit into the public policymaking process? Often, an appraisal is a formal requirement[1] for any investment above a set financial limit, and a specified projected rate of return is a requirement for approval. This applies at all levels of government and is often imposed as a decision rule by the Ministry of Finance. Such a requirement does not necessarily imply that all available options have been considered. This is one of the limitations of project appraisal that you will see as you go through the module: a project may have political backing for various reasons and the appraisal process is designed to support a decision that has already been made.

A more productive use of appraisal is to inform the decision-making process. There may be a variety of ways of solving a policy problem[2], with different rates of return, or different costs for the same results. The comparison of projects to find the best return on a public investment can be an important part of the policy decision process, if it is done in a timely manner.

Some decisions, of course, are made for reasons other than the projected economic, financial or social returns. Some of the very big investment projects in history, such as the construction of the Panama Canal, the Suez Canal, the tunnel between Britain and France, the Hoover Dam in the USA

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1 In the USA, a cost–benefit analysis and consideration of alternatives has been a legal requirement since the River and Harbors Act 1902, and various laws since that time.

2 If you have studied *Public Policy and Strategy* you will be familiar with the wide variety of policy instruments available to policymakers.

or more recent projects such as the Three Gorges Project or the construction of the high-speed train network in China were made without the benefit of careful analysis of returns on investment, but in their own ways transformed their economic and geo-political environments.

How does this module fit into the postgraduate programmes of which it is part? It is a very specific and quite technical module, which will enable you to carry out financial and economic appraisals. It will give you enough theory to understand the financial and economic processes involved in such an appraisal, but the emphasis is on practice, with some critique of the methods involved. There are two related modules: *Environmental and Social Impact Assessment* is specifically concerned with these two aspects of project appraisal, themselves often also a formal requirement of the project approval process; while, the module *Project, Programme and Policy Evaluation* offers a post-hoc process of assessing whether projects, programmes and policies have been successful after implementation.

2 The Module Authors

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Alberto Asquer is the Academic Director of the Public Policy and Management Programme. After a degree in Economics at the University of Cagliari and a Research Doctorate at the University of Salerno in Italy, he did an MSc and a PhD in Management at the London School of Economics. His works on regulatory reform of infrastructure, privatisation and liberalisation of utilities, and organisational change in public sector organisations, have been published in *Governance*, *International Public Management Journal*, *International Journal of Public Administration*, *Utilities Policy*, *Water Policy*, and *Competition and Regulation in Network Industries*.

3 Study Resources

This study guide is your main learning resource for the module as it directs your study through eight study units.

The key text for this module is:

Boardman AE, D Greenberg, AR Vining and DL Weimer (2014) *Cost–Benefit Analysis: Concepts and Practice*. 4th Edition. Harlow UK: Pearson Education Limited.

In addition, you will have access to supplementary module readings, with relevant articles and examples. You will be guided through all of this reading as you work through the module.

4 Module Overview

Unit 1 Investment Appraisal Techniques I

1.1 Introduction
1.2 Cash Flow Analysis
1.3 Private Sector Appraisal Techniques
1.4 Conclusions

Unit 2 Investment Appraisal Techniques II

2.1 Introduction
2.2 Net Cash Flow and the Working Capital
2.3 Mutually Exclusive Projects and Other Issues
2.4 Conclusions
Suggested Solutions to 'Great Eastern Toys (B)' Case

Unit 3 Social Cost–Benefit Analysis

3.1 Introduction
3.2 The Main Stages of a Social Cost–Benefit Analysis
3.3 Theoretical Basis of Social Cost–Benefit Analysis
3.4 Social Cost–Benefit Analysis Case Study
3.5 The Social Discount Rate (SDR)
3.6 Conclusions

Unit 4 Valuation Methodologies in Social Cost–Benefit Analysis

4.1 Introduction
4.2 Revealed Preference Methods
4.3 Stated Preferences – Contingent Valuation
4.4 Summary and Review

Unit 5 Sector Analysis and Case Studies in SCBA

5.1 Introduction
5.2 Transport Projects
5.3 Water
5.4 Education

Unit Content

Units 1 and 2

Units 1 and 2 consider the *investment appraisal* techniques that are used in the private sector. Investment is defined as real capital formation such as the production or maintenance of machinery or housing construction; these types of investment will produce a stream of goods and services for future consumption. Investment involves the sacrifice of current consumption and the production of investment goods, which are used to produce goods or services, and it includes the accumulation of inventories. Investment appraisal is the evaluation of prospective costs and revenues generated by an investment in a capital project over its expected life. Such appraisal includes the assessment of risks (although this is covered separately in Unit 6) and uses a number of different techniques for deciding whether to commit resources to the project. These techniques include discounted cash flow (DCF) and the calculation of net present value (NPV) internal rate of return (IRR).

Unit 3

Unit 3 develops the theoretical and applied aspects of Social Cost–benefit Analysis. The basic tools of SCBA consider the direct costs and benefits of a project but also the wider costs and benefits at the level of the national or regional economy of a country. Social cost–benefit analysis is used mainly for projects where there is public sector investment and where there are wider development aims over and above those of generating revenues and profits, which are the main concern of the private sector.

Unit 4

Unit 4 is about the main valuation techniques of Revealed Preference and Contingent Valuation for the measurement of project impacts that either lack a market price or which can be used to calculate shadow prices, and the unit analyses the strengths and weaknesses of these valuation techniques. It covers cost-effectiveness analysis in situations where project benefits are not measurable and assesses the most appropriate project evaluation techniques for different economic sectors. Finally, it provides a critical review of the advantages and limitations of social cost–benefit analysis.

Unit 5

Unit 5 is about the application of SCBA in transport, water, education, environment and healthcare. It shows how the analysis has been used to make decisions in these sectors and how it can inform the decision-making process.

Unit 6

Unit 6 deals with the issues of risk and uncertainty and presents some of the methods of dealing with this aspect of project appraisal. It covers the different *types* of risk and uncertainty implicit in projects, and some of the techniques for dealing with risk and uncertainty and their strengths and weaknesses. Risks may include physical (climate, weather, earthquakes and other natural disasters), financial, monetary (foreign exchange movements), planning and security risks. As well as risk, to which a probability of occurrence may be assigned, there is another element in project appraisal – *uncertainty*, to which a probability cannot be assigned.

Unit 7

Unit 7 considers some of the important issues associated with the impacts of projects on the distribution of income in country and how SCBA may be used to take these distributional issues into account. When appraisals are being carried out in the context of poverty reduction strategies, the impact on distribution is crucial.

Unit 8

The last unit looks at some of the critiques that have been made of the use of SCBA for decision-making. These include the use of monetary values as a common metric for incommensurate things, the accuracy of forecasts, the

use of monetary values for items that in practice have no monetary value, such as damage to the natural environment.

5 Studying the Module

As you work through the module materials, there are various exercises that are designed to consolidate your knowledge and skills. We recommend that you do the exercises, most of which take half an hour or less, before you look at any model answers that are given in the unit.

At certain points we will ask you to reflect on various aspects of the policy process where you work. It will be valuable for you and your fellow students to share these reflections on the VLE. These short notes setting out the issue and the approach will enrich your and your fellow students' experience of the module.

Please feel free to raise queries with your tutor and with your fellow students, if there are issues that are not clear to you. Do this as soon as you find a problem, because waiting will hold you up as you work through the module.

We hope that you will find the module instructive, useful and occasionally challenging.

6 Glossary

There are a number of technical terms and specialised concepts introduced in this module. The following glossary includes the main ones as a reference guide during your study of the module.

Definitions

Benefit–cost Ratio

The ratio of discounted benefits to discounted costs

Biophysical

The non-human environment, including living organisms (plants and animals) and non-living matter (*eg* water and air)

Cash flow

The flow of money to and from a company, enterprise or project

Consumer surplus

The additional benefit received over and above the amount actually paid by consumers

Consumption rate of interest

The same as the Social Rate of Discount (see below)

Contingent valuation

A process of asking people how much they would be willing to pay for a good or service or how much they are willing to accept to give it up

Cost-effectiveness analysis (CEA)

Analysis which compares the costs of alternative ways of producing the same or similar outputs

Cost of illness

Uses the value of treatment costs of those who fall ill as a result of, say, poor air quality, as the value of the costs of that pollution

Critical path analysis

The analysis and sequencing of each task in a process to calculate the optimum sequence for completion

Cultural/ Heritage impact assessment

Assessment of impacts on anything that may have aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value

Cumulative effects assessment

Assessment of impacts due to numerous separate developments, which might be insignificant on their own, but which can interact or combine to cause significant impacts

Defensive expenditures and replacement costs

DE is the monetary amount that people would be prepared to spend on, say, their environment, to prevent its degradation, and RC represents the cost of restoring that environment to its original state after it has been damaged

Diminishing marginal utility

The more that someone consumes of a particular good, the less value or utility an extra Unit of that good will have

Discount rate

The annual percentage rate at which the present value of a unit of value is assumed to reduce with time

Discounted cash flow (DCF)

A method of appraising investments based on the idea that the value of a specific sum of money depends precisely on when it is received, the value reducing with time

Depreciation

The loss of value of capital goods due to wear and tear, ageing or technical obsolescence

Economic efficiency

The present value of a project's social benefits less the present value of its social costs

Economic impact assessment

Assessment of the impacts of a project on the wider economy, which can be direct, indirect, induced or fiscal

Engagement

Process of interacting with stakeholders to produce better decisions/ outcomes – the level of engagement may increase in level, as follows: inform, consult, involve, collaborate, empower

Evaluation

An assessment of the efficiency, effectiveness, impact, sustainability and relevance of a project in the context of stated objectives

Ex ante appraisal

Appraisal carried out before a project is started, based on prediction and extrapolation

Ex post evaluation

An evaluation of a completed project

Externalities

Also known as spill-over effects and intangible effects – the impacts of a project on third parties or society in general not captured by markets and therefore market prices

Financial analysis

The type of investment appraisal carried out by profit-seeking businesses – it involves the evaluation of the prospective costs and revenues generated by an investment in a capital project over its expected life, excluding non-monetary items and externalities

Gini coefficient

A coefficient based on the Lorenz curve showing the degree of inequality in a frequency distribution such as personal incomes. If the frequency distribution is equal, the Lorenz curve coincides with the 45° line

Hedonic pricing

Hedonic pricing is a method of establishing an economic value for environmental factors such as pollution and environmental degradation; the method uses a surrogate measure such as the impact of pollution on property and land prices, and it assumes that there is specific data on land and property prices which can be assessed against pollution – this is a technique used for calculating revealed preferences (RP)

Human capital

The technique attempts to measure earnings of individuals to value the impacts of such events as education, health-care, risks of accidents and death – a technique used for calculating revealed preferences (RP)

Impact

Any change (beneficial or adverse) in the environment (social or biophysical) as a result of human activity

Impact analysis

A detailed accounting of the environmental, health and social impacts of a project

Infrastructure projects

Infrastructure projects are normally concerned with the provision of roads, airports, ports, sewage and water systems, railways, telecommunication and other public utilities such as schools, hospitals and clinics; such projects are basic to economic development and improvements in infrastructure may also be used to attract industry and investment to a particular country and or region

Integrated assessment

Forms of impacts assessment that aim to align/combine a number of established assessment techniques (*eg* Economic Impact Assessment + Social Impact Assessment), and/or to compare/explore interrelationships between themes (*eg* biophysical and social)

Internal rate of return (IRR)

The discount rate that produces a NPV of zero

Investment appraisal

The evaluation of the prospective costs and revenues generated by an investment in a capital project over its expected life

Kaldor-Hicks compensation test

A project or policy should be adopted only if those who gain could fully compensate those who lose and still be better off

Life-cycle assessment

Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

Lorenz curve

A graphical representation showing the degree of inequality of a frequency distribution in which the cumulative percentages of a population are plotted against the cumulative percentage of the variable under study (*eg* incomes, employment)

Marginal utility of income

The extra satisfaction gained by a consumer from a small increment in income

Mitigation

Measures to prevent/ eliminate, reduce/ minimise, remediate/ repair or compensate adverse impacts

Monte Carlo method

Method for estimating probabilities – it involves the construction of a model and the simulation of the outcome of an activity a large number of times

Net present Value (NPV)

The difference between the discounted present value of future benefits and the discounted present value of future costs

Opportunity cost of capital

The next best alternative return available for the funds in the capital markets

Opportunity cost

The value of the most valuable of alternative uses

Pareto efficiency

A position in which it is not possible to make at least one person better off without making anyone worse off. Also known as allocative efficiency

Pay Back

The period over which the cumulative net revenue from an investment project equals the original investment

Present value

The discounted value of a financial sum arising at some future period

Private costs and benefits

The costs incurred and the benefits received by those producers and consumers immediately involved in a project

Private rate of return (PRR)

The rate of return to an individual or business of some activity or investment – only includes the costs incurred by that individual or business (private costs) and the benefits to that individual or business (private benefits)

Production-function methods

These methods measure the impact of, for example, pollution, on production and output, and use the market prices of that production/output to value these impacts

Problem tree

A diagrammatic representation of a negative or potentially negative situation showing a cause and effect relationship

Programme

A programme includes a number of related but distinct projects

Project

A series of activities with set objectives to produce a specific outcome within a limited time frame

Project cycle

The project cycle follows the life of the project from the initial idea through to its completion

Public goods

Goods that are both non-rivalrous in consumption and no one can be prevented from consuming them (non-excludable)

Quality adjusted life years (QALYs)

Morbid life years are adjusted by subjective measures of quality where a fully functional year of life is given a weight of 1 and dysfunctional years are counted as fractions

Rate of return

Net profit after depreciation as a percentage of average capital employed in the business – the rate of return calculation may be made using profit before or after tax

Relevant cash flows

The cash costs and revenues incurred as a result of an investment

Return on capital employed (ROCE)

Ratio of accounting profit generated by an investment project to the required capital outlay, expressed as a percentage

Revealed preference (RP)

The value of non-market impacts of a project are inferred from observable behaviour in markets for related goods and, in particular, purchases made in actual markets

Risk

A future event or outcome to which some measure of probability can be attached

Risk analysis

The determination of the probability of different outcomes for a project

Sensitivity analysis

The identification of important areas of uncertainty to test key assumptions in a systematic way in order to determine the factors that are most likely to affect project success and to identify possible measures that could be taken to improve the chances of success (*eg* discount rate used, project life, year in full project revenue is achieved)

Shadow price

The opportunity cost to society of participating in some form of economic activity – it is applied where actual prices cannot be charged or where prices do not reflect the true scarcity value of a good

Significance

The significance of impacts is typically determined by considering their magnitude/severity, extent, duration and probability – opposite ends of the spectrum are:

- highly significant impacts: Impacts that are diverse, irreversible and/or unprecedented
- low significance/ insignificant impacts: Impacts that are generally site-specific, largely reversible, and – in relation to adverse impacts – readily addressed by mitigation

Social

Anything relating to humans and their interactions, including economic, cultural, human rights, health and safety concerns

Social cost–benefit analysis (SCBA)

Analysis of future cost and benefit streams from a project, including items for which the market does not provide a satisfactory measure of economic value

Social costs and benefits

The total costs and benefits of a project including both the private costs and benefits and the spillovers (externalities) on third parties and society in general

Social rate of discount

An adjusted discount rate in which the discount rate may be adjusted to take account of time preference: the importance of the project to future generations

Social Rate of Return (SRR)

The rate of return to society as a whole of some activity or investment. Includes the social costs to society (private costs plus externalities) and the social benefits to society (private benefits and external benefits)

Social welfare

The total wellbeing of a community

Social welfare function

An expression of society's taste for different economic states

Stakeholders

The people, groups or institutions likely to affect or be affected by or have an interest in a project

Stakeholder analysis

Consultation with stakeholders on their priorities for incorporation in a project or ex-post analysis of the actual impacts of a project on stakeholders

Straight-line depreciation

Where the residual (scrap value) of an asset is deducted from the original cost and the balance is divided equally by the number of years of estimated life

Sustainability assessment

Assessment processes that aim to determine whether or not an initiative will contribute to sustainable development

Switching value (decision pivot point)

The percentage change in a project variable (investment costs, revenue etc) required to change the NPV to zero by interpolation

Travel cost method (TCM)

The value of an environmental location is the time and cost that people take to travel to that location plus the admission charge if there is such a charge

Uncertainty

A future event or outcome to which no probability of its occurrence can be attached

Vulnerable individuals or groups

People who are differentially or disproportionately sensitive to change (or in need of change), since they are underrepresented, disadvantaged or lacking in power/ influence/ capacity

Weighted average cost of capital (WACC)

Investment projects may be financed by debt and/or equity in the private sector – the respective costs of both types of finance are weighted by the proportions used to finance a particular project in order to calculate that project's cost of capital

Welfare/Distributional weights

The weighting attached to a particular cost or benefit for a particular project beneficiary

Willingness to accept

The compensation required to return an individual to his or her original state of economic well-being following some change (possibly hypothetical) in the world

Working capital

The cash to fund the stock of goods/inputs that a business needs to hold in order to operate

Willingness to pay

(WTP) The willingness of an individual to pay in order to get a good or services