Plenary 8: Assessing Project Feasibility
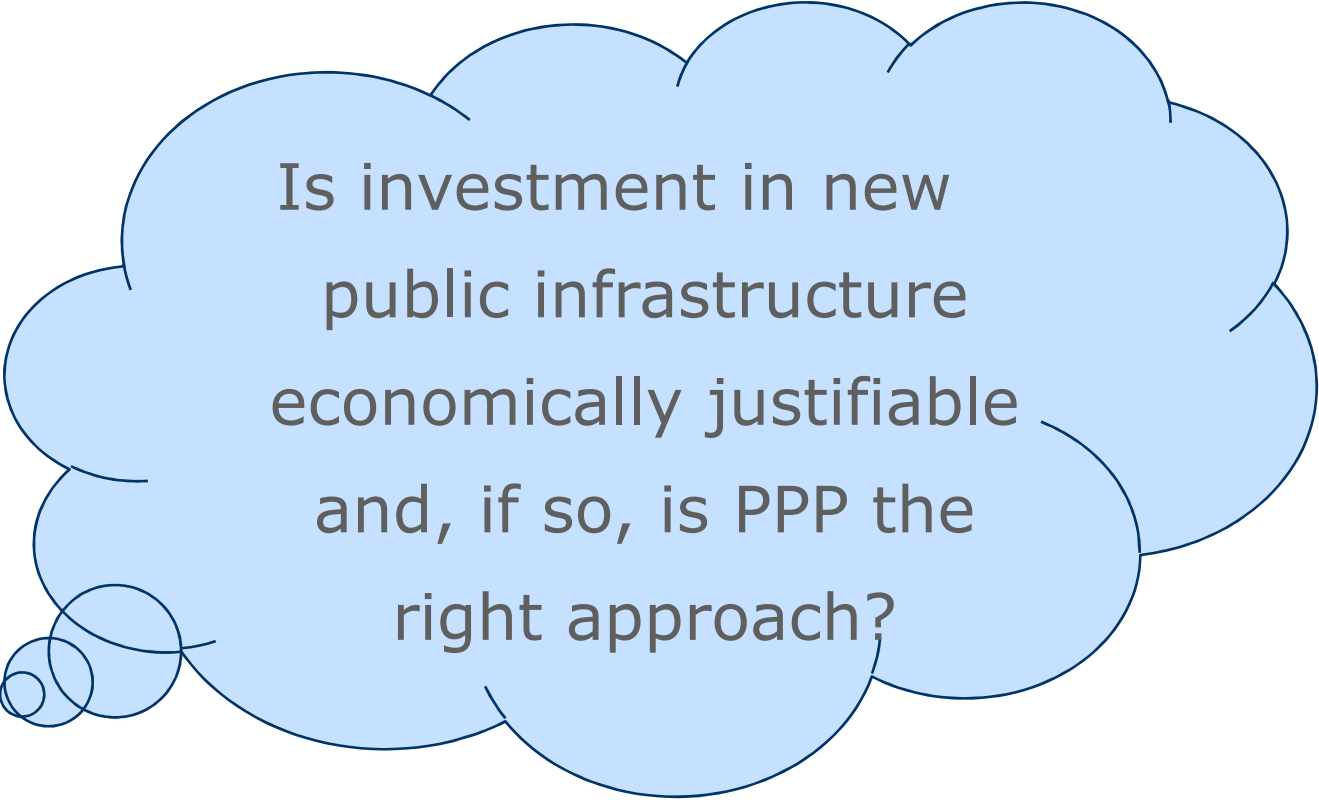
Tuesday, 14:00 to 15:00

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Session agenda

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Is investment in new public infrastructure economically justifiable and, if so, is PPP the right approach?

Session agenda

Economic viability

When deciding whether an investment is economically justifiable, the public sector should:

- identify the costs and benefits of the project, including 'externalities';

- prepare a cost-benefit analysis (using an appropriate discount rate to be applied to future costs and benefits); and

- calculate the economic return of the project.

The initial evaluation of a public-sector project should include to widest possible range of costs and benefits, including:

- Long-term **financial benefits** of a new facility compared with continuing to operate the existing one, e.g. maintenance cost savings

- **Other benefits** which can be priced, e.g. journey time savings

- Wider economic or social benefits or costs, also known as **externalities**

Economic & Financial viability concepts

Externalities

The term 'externalities' is used to describe the economic, social, environmental or other effects of a project, the benefit or cost of which cannot be charged to users of the facility. Externalities may include:

- Economic development, e.g. increases in land values or general economic activity

- Effects on safety or public health, e.g. reductions in accident deaths once a new road is built

- Environmental impact, e.g. decreases (increases) in noise or air pollution

Externalities cannot easily be included in the costs paid by Concession users. The existence of positive externalities could justify the introduction of public-sector support for a project, in the form of **subsidies**

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2. Economic and financial viability concepts

3. Key considerations to determine if a project is viable

4. Basic metrics and issues to consider

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Determining if a project is viable

Cost-Benefit Analysis (CBA)

Cost-benefit analysis compares the benefits of a project its cost, to assess whether a project is viable

- A **discounted cash flow (DCF)** calculation is used to allow for the different timing of costs and benefits

- The proposed means of funding for the project is irrelevant in a CBA, since economic benefits are independent of this

The benefit of a public–sector project can be assessed as:

Benefits:	Costs:
NPV of project benefits, plus	NPV of project costs, plus
NPV of positive externalities	NPV of negative externalities

Any project with a cost-benefit ratio over 1 is viable

Cost-Effectiveness Analysis

If the benefits of a project cannot easily be measured, then the costs only of the different solutions would need to be compared – this is known as a **cost effectiveness analysis**

Determining if a project is viable

Discounting is the process of finding the present value (i.e. the value today,) of an amount of cash at some future date

- The discounted value of a cash flow is determined by reducing its value by the appropriate **discount rate** for each unit of time from the time at which the cashflow is being valued (i.e. today,) to the time of the cash flow occurs – the discount rate is normally expressed as an annual rate

- A **discounted cash flow (DCF)** calculation is the NPV of a series of future cash flows

Example:

- Assume discount rate is 10% per year

- Assume a set of cash flows of $100, $100 and $100 over a three year period

- At its simplest, the value of the cash flows in today's terms in valued as follows:

  - Year 1: $100 / (1-10%)^1 = $90.9
  - Year 2: $100 / (1-10%)^2 = $82.6
  - Year 3: $100 / (1-10%)^3 = $75.1
  - **Total value of cash flows**   = **$248.6**

Choosing a discount rate

Public-sector Discount Rate

The question of what discount rate to use for assessing the viability of a public-sector investment decision is a difficult one. Approach varies considerably by country

- The choice of discount rate is crucial in determining the present value of a project's cashflows and, therefore, whether the project is viable or not

    o   If the discount rate is too **high**, the effect may be to **undervalue** the benefit of cashflows which occur some considerable time in the future

    o   As a public-sector investment typically involves an initial negative investment followed by years of positive cashflows, the **lower** the discount rate, the more **attractive** the investment will seem

- No 'right' discount rate to use – could use a range of discount rates

- Alternative approach - use the **risk-free rate** as discount rate, but perform sensitivity analysis on project cashflows

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Basic metrics

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Net Present Value

NPV is the value today of a sum of money due in the future, discounted at the cost of money.

The formula for an NPV calculation is:

$$PV = \frac{FV}{(1+i)^n}$$

Where:

PV = present value, i.e. 'money today'

FV = future value, i.e. money in the future'

i = the interest or discount rate; and

n = the number of periods , e.g. annual semi-annual etc. (with discount rate adjusted accordingly)

- If the total NPV of project cashflows, discounted at an agreed discount rate, is **positive** the project can be justified

NPV example

An NPV calculation can also be used to calculate which is the better of two projects with different cashflows

(a) Year	(b) Discount factor $[(1+0.1)(a)]$	Investment A (c) Cash flow	NPV $[(c) \div (b)]$	Investment B (d) Cash flow	NPV $[(d) \div (b)]$
0	1.0000	-1000	-1000	-1000	-1000
1	1.1000	340	309	200	182
2	1.2100	305	252	235	194
3	1.3310	270	203	270	203
4	1.4641	235	161	305	208
5	1.6105	200	124	340	211
Total		**350**	**49**	**350**	**-2**

Clearly **Investment A** is the better project. The differences in the NPV calculations illustrate the importance to investors of the timing of cashflows

Internal Rate of Return

The IRR measures the rate of return on a stream of project cashflows over the life of a project. It is the discount rate at which the NPV of the project cash flows is **zero**

- Limited value in project feasibility assessment

Economic Rate of Return (ERR)

ERR is a method for the public sector to measure the net benefits of a project

- In an ERR calculation, the investment has to pass an IRR hurdle rate equivalent to the public-sector discount rate to be considered viable

Basic metrics

> **Uses in PPPs**
>
> DCF and IRR calculations are used in a variety of different ways by different parties to a PPP project

By the public sector...

- DCF used when deciding whether to proceed with the procurement of a project – Economic Rate of Return (ERR) may also be used in this case

- DCF used in the Public-sector Comparator

- DCF used to evaluate bids for a PPP project

By investors...

- Project IRR may be used to assess the financial viability of a project without taking account of its financial structure

- Equity IRR commonly used as a hurdle rate for investments – investment justified if Equity > x%

Basic metrics

In PPP contracts...

- Equity IRR may be used to calculate Service Fees compensation for changes in circumstances during the life of the PPP contract or refinancing gains

- DCF may also be used to determine compensation to investors for early termination of a PPP contract

By lenders...

- Project IRR used to calculate Loan-Life Cover Ratio

Issues to consider

NPV and different-sized projects

When comparing two different projects, account has to be taken of their relative sizes

		Investment C	Investment D
(a)	Original investment	-1000	-2000
(b)	Cash flow 1 year later	1400	2600
	NPV @ 10%	273	364
	IRR	40%	30%
Cost-benefit analysis			
(c)	NPV of benefits [= NPV of (b)]	1273	2364
(d)	NPV of costs [= (a)]	1000	2000
	Cost benefit ratio [(c) ÷ (d)]	1.27:1	1.18:1

Investment D has a higher NPV than investment C because of its larger size. An IRR calculation shows that Investment C is the better investment. To better compare these investments, the NPV comparison should be expanded with a full **cost-benefit analysis**

Discounting costs a long way in the future

The use of NPV to make public-sector investment decisions gives very little weight to the future financial burden created where large costs occur towards the end of a project

Example:

- A project involves decommissioning costs for the public sector of $1 million in 30 years time

- Discounting at 10%, the value of the cost in today's terms is:

    o   Year 30: $1,000,000 / (1-10\%)^{30} \qquad = \$57,309$

- $57,309 may be very in relation to the NPV of the project as a whole.

- But, $1 million will still need to be found by the public sector in 30 years to fund the decommissioning costs at that time

Note: The higher the discount rate the more the effect of such costs is disregarded

Issues to consider

IRR & cash reinvestment

The standard IRR calculation assumes that cash taken out of a project will be reinvested at the IRR rate until the end of the calculation period

Year	Investment C Cash flow	Investment D Cash flow	Investment C Annual Cash Flow reinvested @ 15% to year 5
0	-1000	-1000	
1	298	0	522
2	298	0	454
3	298	0	395
4	298	0	343
5	298	2011	298
Total	**492**	**1011**	**2011**
NPV @ 12%	**75**	**141**	
IRR	**15%**	**15%**	

IRR calculation overvalues early cashflows

1 2 3 4 5 6

IRR & cash reinvestment

Two ways of dealing with this distortion:

Modified IRR (MIRR)

- An IRR calculation with a reduced reinvestment rate for cash taken out of the project

- Cashflows reinvested at less than the IRR rate, e.g. the public-sector discount rate

Payback period

- The length of time it takes for to recover the original cash investment in a project

- Supplement standard IRR calculation with 'payback period' – provides a useful check

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Viability gap

- The viability gap is the shortfall in revenues between project income and what is required to cover capital expenditure, operating expenditure and other financing requirements necessary to make the project financially viable or financeable.

- Some country governments have set up dedicated 'viability gap schemes' or initiatives that meet the funding gap required to make an economically essential project commercially viable.

- the Government of India has instituted a Viability Gap Fund (VGF) since 2006 and the Government of Pakistan is currently in the process of establishing a similar initiative.

VIABILITY GAP = REVENUES - CAPEX – OPEX – FINANCING COSTS

Causes of viability gaps

The scale of the viability gap will be dependent upon a range of revenue and cost factors:

- The level of the realisable customer tariff, which in turn will be determined by:
    - the public's ability to pay; and
    - the public's willingness to pay.
- The scale of the new investment required.
- In the case of private finance or PPPs:
    - private financing is typically more expensive than public and its tenor is also typically shorter requiring faster repayment;
    - risk aversity amongst private financiers in the absence of any guarantee; and
    - if there is no award of a terminal value at the end of a concession and the length of the concession is much shorter than the economic life of the assets, the resulting amortisation schedule will lead to a high annual depreciation charge and again a higher tariff if the project is to be profitable.
- While affordability is one factor, inefficient financial structures, limited availability of financial instruments and investor risk aversity can be major contributing factors.

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Summary

- **Project feasibility should be thought about in terms of the likely returns on an investment**

- **Financial modelling of likely returns is key**

- **Simple metrics exist to help the assessment but very dependent on assumptions**

- **Lack of financial viability can be tackled in different ways – what is vital is to ensure that any proposed approach is sustainable!**

Further sources

Online

1. India's Viability Gap Funding Scheme:

   http://www.pppinindia.com/pdf/scheme_Guidelines_Financial_Support_PPP_Infrastructure-english.pdf

2. MIT Open course on project appraisal: http://ocw.mit.edu/courses/urban-studies-and-planning/11-484-project-appraisal-in-developing-countries-spring-2005/

Books

1. Finnerty "Project Financing: Asset-Based Financial Engineering" (1996)