Lecture 9b

Public Sector Analysis Objectives and Challenges

Implications on Discount Rates

The Athabasca Oil Sands

The Athabasca Oil Sands, cont'd

- For centuries, people have known about the sticky bitumen that lines the banks of the Athabasca River in northern Alberta.
- Over the years, many people dreamed of producing usable oil from the bitumen, but the sand and oil are not easily separated, and extraction of the oil was not viewed as economically viable.

The Athabasca Oil Sands, cont'd

- In 1964, the Sun Oil Company, with government support, formed the Great Canadian Oil Sands Company, which in 1967 started to mine and process shallow deposits of oil sands.
- The target production was 31,000 barrels a day, and the initial production cost would be in the area of $25 a barrel. The world price was then about $3.50, but the planners were predicting that production costs would decline and market prices would increase.

The Athabasca Oil Sands, cont'd

- The successor to Great Canadian Oil Sands, Suncor Energy, was producing 130,000 barrels of oil a day. The production costs were in the range of $12 a barrel, and the world price of oil was nearly $50.
- In 2004, the price of oil rose above $40. A series of world events led the price to climb to $70 in 2006 and to exceed $100 in early 2008.

The Athabasca Oil Sands, cont'd

- By 2016, new technologies increased US domestic oil production, and the price of crude oil declined to less than $50 per barrel.
- A forest fire devastated Alberta's oil sands region, reducing output by 40%.
- Record-breaking global temperatures underlined the seriousness of global warming, with many scientists predicting that, for the global temperature anomaly to be kept below two degrees, the oil in the oil sands must be kept in the ground.

Learning Objectives

- Recognize the unique objective and viewpoint of public decisions
- Explain methods for determining the interest rates for evaluating public projects
- Discuss the effect of financing, duration, and politics in public-investment analysis
- Learn cost-effectiveness analysis method and how it contrasts with other methods

Key Summary: Update

- Variables and parameters (puzzle pieces):
  - Different kinds of interest rates
  - Discount rates
  - Costs and **cost savings or revenues**, now and in the future
  - Different expected lives of the possible project/purchases
  - Salvage value
  - Taxes and tax savings
  - How these escalate
- Analysis methods (ways to put the pieces together):
  - Present worth analysis (Net Present Value)
  - Equivalent uniform annual cost analysis
  - Rate of return analysis
  - Benefit-cost ratio analysis
  - Payback period
  - Cost-effectiveness analysis

Public Sector Investment Objectives and Challenges

11

Public Sector Investment Objectives and Challenges

Investment decisions are more difficult in the public sector than in the private sector, for many reasons including:

a) broader scope of analysis and of impact
b) Implications of long-lived projects
c) need to also consider social and environmental benefits
d) conflicting benefits
e) financial caps and other uniquenesses
f) politics

Scope for Analysis

- Economic analysis, both governmental and industrial, must be based on a viewpoint.
- Possible viewpoints that may be taken include those of an individual, a business firm or corporation, a regional municipality, a city, a province, a nation, or a group of nations.

Scope for Analysis, cont'd

- Industry viewpoint consists largely of the counting of costs and benefits.
  - External consequences are typically not considered unless there is government regulation in that regard.

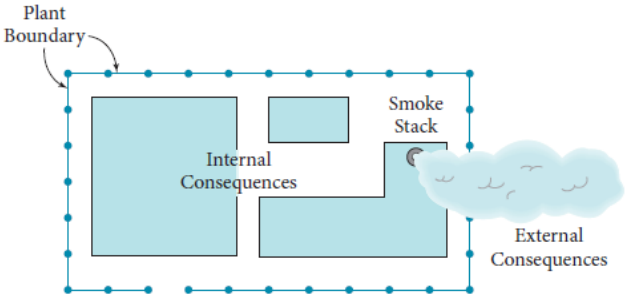

FIGURE 8-1 Internal and external consequences of an industrial plant.

Scope for Analysis, cont'd

- Government generally takes the viewpoint of its constituents.
  - Municipality, province, and country
- A viewpoint for any problem is to take the viewpoint at least as broad as those who pay the costs and those who receive the benefits.
  - Costs can spread across different areas and benefit local regions (bridges, etc.).

Scope for Analysis, cont'd

- Note the implications of this for problems of a global nature (like global warming, or CFC impacts on the ozone layer): **the analysis viewpoint and level of coordinated action should match the scope of the problem.**
- Addressing ozone layer depletion is somewhat a success story:
  - More than 30 years after the Montreal Protocol, NASA scientists documented the first direct proof that Antarctic ozone is recovering because of the CFC phase-down: Ozone depletion in the region has declined 20 percent since 2005. And at the end of 2018, the United Nations confirmed in a scientific assessment that the ozone layer is recovering, projecting that it would heal completely in the (non-polar) Northern Hemisphere by the 2030s, followed by the Southern Hemisphere in the 2050s and polar regions by 2060. (National Geographic, April 18, 2019)
- Will the same be possible for other present and future challenges like global warming?

Scope for Analysis, cont'd

EXAMPLE 8-1

A municipal project will cost $1 million. The provincial government will pay 50% of the cost if the project is undertaken. Although the original economic analysis showed that the PW of benefits was $1.5 million, a subsequent detailed analysis by the city engineer finds that a more realistic estimate is $750,000. The city council must decide whether to proceed with the project. What would you advise?

SOLUTION

From the viewpoint of the city, the project is still a good one. If the city puts up half the cost ($500,000) it will receive all the benefits ($750,000). On the other hand, from an *overall* viewpoint, the revised estimate of $750,000 of benefits does not justify the $1 million expenditure. That illustrates the dilemma caused by varying viewpoints.

Long-lived Projects

- Private sector:
  - project life:
- Government sector:
  - Project life:
  - Implications on managing capital costs:

Quantifying and Valuing All Benefits and Costs

- Many public sector projects have consequences (both as benefits, AND as costs not related to construction/operation) that are difficult to state in monetary terms.
- These often concern social and/or environmental impacts.
- Therefore, the estimated values will have more uncertainty than is typical for private sector projects.
- Sometimes, broader analysis takes place ("triple bottom line")

Valuing Conflicting, Mutually Exclusive Benefits

- Costs and benefits may apply to different groups of businesses and people, with conflicting objectives
- Dam project example:

Project Financing

- Governmental and market-driven firms differ in the way investments in equipment, facilities, and other projects are financed.
- Firms rely on monies from individual investors (through shares and bonds), private lenders, and retained earnings from operations.
- The government sector often uses taxation and bonds as the source of investment capital.
- Municipal and regional governments tend to place a cap on their debt ratio, which constrains borrowing and spending.

Project Financing, cont'd

- In government, taxation and revenue from operations is adequate to finance only modest projects. However, public projects tend to be large in scale, which means that for many public projects 100% of the investment costs must be borrowed.
- Smaller projects are fully funded through taxation.
- Larger projects typically require borrowing through bonds.
- Sometimes P3s - public–private partnerships – are used.
  - Needs identified by the government, who then enters into an agreement with private industry to implement a project and meet that need.

Politics

- Political influences are felt in nearly every decision made in any organization.
- In government, the effects of politics are felt continuously at all levels due to:
  -
  -
  -
  - Electoral cycles

Public Sector Investment Objectives

Investment decisions are more difficult in the public sector than in the private sector, for many reasons including:

a) Many projects involve social and environmental benefits, which are more difficult to measure financially and to compare,

b) different options often benefit different groups, and options sometimes conflict with each other,

c) financial caps on spending often exist, due to financial or political reasons

d) some decisions have long-term impacts, and

e) politicians are elected for short cycles and sometimes have difficulty balancing short term political needs with long-term societal needs.

Implications on Discount Rates

28

Selecting an interest rate

- The goal of public investment involves the use of public resources to promote the general welfare and to secure the benefits of a given project.
- Setting an interest rate in the public sector is not as clear-cut as doing so in industry.
- The possibilities include no interest rate, cost-of-capital concepts, and opportunity-cost concepts.
- Interest rate vs discount rate:

Time-value-of-money

- In government, monies are obtained through taxation and spent about as quickly as they are obtained.
- Some would argue that there is little or no time lag between collecting and spending tax dollars.
- By this rationale, a 0% interest rate should apply to economic analysis of public projects.

- At Metro Vancouver:

Cost-of-Capital Concept

- Most levels of government (federal, provincial, and local) borrow money for capital expenditures in addition to collecting taxes.
- Thus, use an interest rate equal to the *cost of borrowed money*.

- Municipal / regional / provincial/ federal governments:

Opportunity-Cost Concept

- Opportunity-cost (i.e., the interest rate on the best opportunity forgone) may take two forms in governmental economic analysis:
  - Government opportunity-cost
  - Taxpayer opportunity-cost

Otherwise said:

Government Opportunity-Cost

- If the interest rate is based on the opportunity-cost to a government agency or other governing body, that interest rate is known as **government opportunity-cost.**
- In this case, the interest rate is set at that of the best prospective project for which funding is not available.
- One disadvantage of this concept is that different government subdivisions will have different opportunities.
- Therefore, political units could use different interest rates, resulting in inconsistent decisions across government.
- Practicality:

Taxpayer Opportunity-Cost

- Dollars used for public investments are generally gathered by taxing the citizens.
- The concept of **taxpayer opportunity-cost** suggests that a correct interest rate for evaluating public investments is that which the *taxpayer* could have received if the government had not collected those dollars through taxation: **Taxpaying residents and businesses would have used the money in some other way if they hadn't been taxed, and the interest they would have earned is one possible choice of an appropriate interest rate (and discount rate).**
- This philosophy holds that taxation takes away the taxpayers' opportunity to use the same dollars for investment.
- The interest rate that the government requires should not be less than what the taxpayer would have received.
- Practicality:

Choosing a Discount Rate

- Textbook guidance: General rule of thumb:
  - Apply the larger interest rate of the two:
    - Government opportunity-cost
    - Taxpayer opportunity-cost
- Assumptions behind this:
- However, as is the case in the private sector, there is no hard and fast rule universally applied in all circumstances.
- The setting of an interest rate for use in economic analysis is at the discretion of the government.

Interest Rates and Discount Rates: Metro Vancouver Policy

At Metro Vancouver, we use the concept:

- Reasoning for doing so:

Metro Vancouver has established two discount rates:

- Short term discount rate:
- Long term discount rate:
- Bases for establishing these rates: