Capital Budgeting: Externalities

(Welch, Chapter 13-4)

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Externalities, Additivity, Overhead, Agency

Adding NPV

When can you add the NPV of two projects?

Negative Externalities

What are examples of negative externalities?

Background Economics

What is a **public good**?

- Is *exclusivity* good?
- Is it not better to get something for free?

What are **Pigouvian Taxes**?

What is the **Coase Theorem**?

What are humanity's biggest challenges?

Negative Externalities

What should a company do if a project has a negative externality on another project?

Positive Externalities

What are examples of positive externalities?

Why do Firms Exist?

Why do firms even exist?

Why not contract with vendors in the market?

Many Projects

What is the correct capital-budgeting project rule with many projects *and* (non-zero) externalities?

The Cost of a Resource

Our company produces revenues of $1.4m/mo.
Assume the company will exist forever.
Assume E(r)=10%.
It has office staff which costs $300k/mo.
It rents 40k sqft at a price of $800k/mo, but 10k sqft remains unused.
What is the cost/sqft of rent/mo?

The Implicit Rent

Our company is contemplating expansion.

A new division could use the remaining 10k sqft, but it would cost \$500k to develop, and bring in \$210k/mo forever.

What should the company charge this new division for rent?

Profitability of New Division

Taking the rent into account, what would be the net profit of the new division?

Not taking the rent into account, what would be the net profit of the new division??

Should the firm expand?

Existing Division Chairs

What will the existing division chairs argue?

Will they celebrate higher firm profits?

Overhead Allocation

How do most corporations allocate overhead?

(Chapter 13 has more examples.)

The Marginal Approach to Externalities

Economies of Scale and *Scope* are externalities.

You can handle externalities with a marginal perspective, too:

- Should you invest in one *additional* project?
- The answer is yes only if it increases the value of your operations.

(Chapter 13 has many more examples.)

Omitted Marginal Approach

$$\text{Test} = \text{PV with project} - \text{PV without project}$$

- If Test > 0 take on the project.
- If Test < 0 reject the project.
  - This is equivalent to adding/subtracting externalities where appropriate.
- If one project is already given, you can think of adding another project "on the margin."
  - For adding projects, always think of marginal contributions, not average contributions.

A More Realistic Game

Consider a fairly decentralized firm that is considering to build an access road (or computer system or ...) that could benefit all divisions.

Once built, if not congested, would the CEO want to prevent other divisions from using it?

Unauditable Division Benefits

The Project Cost: $50 million.

Public (noisy) guesses of benefit:

- A: $8m ± $3m.
- B: $3m ± $3m.
- C: $1m ± $3m.
- D: $15m ± $3m.
- E: $5m ± $3m.
- F: $10m ± $3m.

Corporate Hierarchy

I am the main CEO.

You are division managers and report to me.

I exist because I need to coordinate actions.

You exist because I don't know everything—you know your business better than I do.

I need to decide whether to build the road or not—and how to charge you (or not).

Capital Budgeting Decisions

Should I build the road?

How should I *allocate* the cost.

- Yes, I can talk to you.
- I can *ask* you how much it is worth to you.
- I can divine.
- I can make capricious decisions. I *am* the CEO.

CEO is Dictator

For example: If A reports \$50 million, B reports \$70 million in gain, and everyone else says \$0, then I could allocate

- $\$40/(\$40 + \$70) = 1/3$ of the cost to A, and
- the rest (2/3) to B,

i.e., \$17m and \$33m, respectively.

Or I could charge everything equally.

Or I could charge my noisy guess of value.

Division Bonuses

At the end of the year, division performance is assessed based on division profit.

Presumably, profit is net of allocated cost.

But profits are also higher when the firm took projects that were more worthwhile.

Example of Bonus Schemes

Say, without the project,

- A's manager is expected to take home \$1m.
- B's manager is expected to take home \$2m.

What if road is built?

- If A says it was worth \$3m, but it truly increased it by \$10m, her division profits will be \$7m more!
- A would get a bonus based on the \$7m.
- *and* Manager A could even become next CEO!

Prepare For Decision Meeting

CEO Needs Consultants

Can you give me advice what to do?

CEO Trust?

Why/When would division managers not tell me the truth?

Are we not all in the same boat?

How could I reduce lying?

General Trust Problems

Do you think managers and employees might act not in your interest?
Would you worry about it?
Would you write spaghetti code or clean code?
How many CEOs have designated successors?
What/Who earns rents?

Types of Projects/Firms

In what kind of projects/firms *are* these "agency" problems most rampant?

Alleviating Concerns

What can an owner do to alleviate these concerns?