Principles of Managerial Finance

9th Edition

Chapter 8

Capital Budgeting and Cash Flow Principles

Learning Objectives

- Understand the key capital budgeting expenditure motives and the steps in the capital budgeting process.
- Define the basic terminology used to describe projects, funds availability, decision approaches, and cash flow patterns.
- Discuss the major components of relevant cash flows, expansion versus replacement cash flows, sunk costs and opportunity costs, and international capital budgeting and long-term investment decisions.

Learning Objectives

- Calculate the initial investment associated with a proposed capital expenditure, given relevant data.
- Determine relevant operating cash inflows using the income statement format.
- Find the terminal cash flow given relevant data.

Introduction

- Capital Budgeting is the process of identifying, evaluating, and implementing a firm's investment opportunities.
- It seeks to identify investments that will enhance a firm's competitive advantage and increase shareholder wealth.
- The typical capital budgeting decision involves a large up-front investment followed by a series of smaller cash inflows.
- Poor capital budgeting decisions can ultimately result in company bankruptcy.

Key Motives for Capital Expenditures

TABLE 8.1 Key Motives for Making Capital Expenditures

Motive	Description
Expansion	The most common motive for a capital expenditure is to expand the level of operations—usually through acquisition of fixed assets. A growing firm often needs to acquire new fixed assets rapidly, such as the purchase of property and plant facilities.
Replacement	As a firm's growth slows and it reaches maturity, most capital expenditures will be made to replace or renew obsolete or worn-out assets. Each time a machine requires a major repair, the outlay for the repair should be compared to the outlay to replace the machine and the benefits of replacement.
Renewal	Renewal, an alternative to replacement, may involve rebuilding, overhauling, or retrofitting an existing fixed asset. For example, an existing drill press could be renewed by replacing its motor and adding a numeric control system, or a physical facility could be renewed by rewiring and adding air conditioning. To improve efficiency, both replacement and renewal of existing machinery may be suitable solutions.
Other purposes	Some capital expenditures do not result in the acquisition or transformation of tangible fixed assets. Instead, they involve a long-term commitment of funds in expectation of a future return. These expenditures include outlays for advertising, research and development, management consulting, and new products. Other capital expenditure proposals—such as the installation of pollution-control and safety devices mandated by the government—are difficult to evaluate because they provide intangible returns rather than clearly measurable cash flows.

Key Motives for Capital Expenditures

Examples

😐Replacing worn out or obsolete assets

😐improving business efficiency

😐acquiring assets for expansion into new products or markets

😐acquiring another business

😐complying with legal requirements

😐satisfying work-force demands

😐environmental requirements

The Capital Budgeting Process

Step 1: Identify Investment Opportunities

- How are projects initiated?

- How much is available to spend?

Step 2: Project Development

- Preliminary project review

- Technically feasible?

- Compatible with corporate strategy?

Step 3: Evaluation and Selection

Our Focus

- What are the costs and benefits?

- What is the project's return?

- What are the risks involved?

Step 4: Post Acquisition Control

- Is the project within budget?

- What lessons can be drawn?

Independent versus Mutually Exclusive Investments

- Mutually Exclusive Projects are investments that compete in some way for a company's resources. A firm can select one or another but not both.
- Independent Projects, on the other hand, do not compete with the firm's resources. A company can select one, or the other, or both -- so long as they meet minimum profitability thresholds.

Unlimited Funds Versus Capital Rationing

- If the firm has unlimited funds for making investments, then all independent projects that provide returns greater than some specified level can be accepted and implemented.
- However, in most cases firms face capital rationing restrictions since they only have a given amount of funds to invest in potential investment projects at any given time.

Data & Information Requirements

External Economic & Political Data

Business Cycle Stages

Inflation Trends

Interest Rate Trends

Exchange Rate Trends

Freedom of Cross-Border Currency Flows

Political Stability

Regulations

Taxation

Data & Information Requirements

Internal Financial Data

Initial Outlay & Working Capital

Estimated Cash Flows

Financing Costs

Transportation, Shipping and Installation Costs

Competitor Information

Data & Information Requirements

Non-Financial Data

Distribution Channels

Labor Force Information

Labor-Management Relations

Status of Technological Change in the Industry

Competitive Analysis of the Industry

Potential Competitive Reactions

Relevant Cash Flows

- Incremental cash flows
  - only cash flows associated with the investment
  - effects on the firms other investments (both positive and negative) must also be considered

For example, if a day-care center decides to open another facility, the impact of customers who decide to move from one facility to the new facility must be considered.

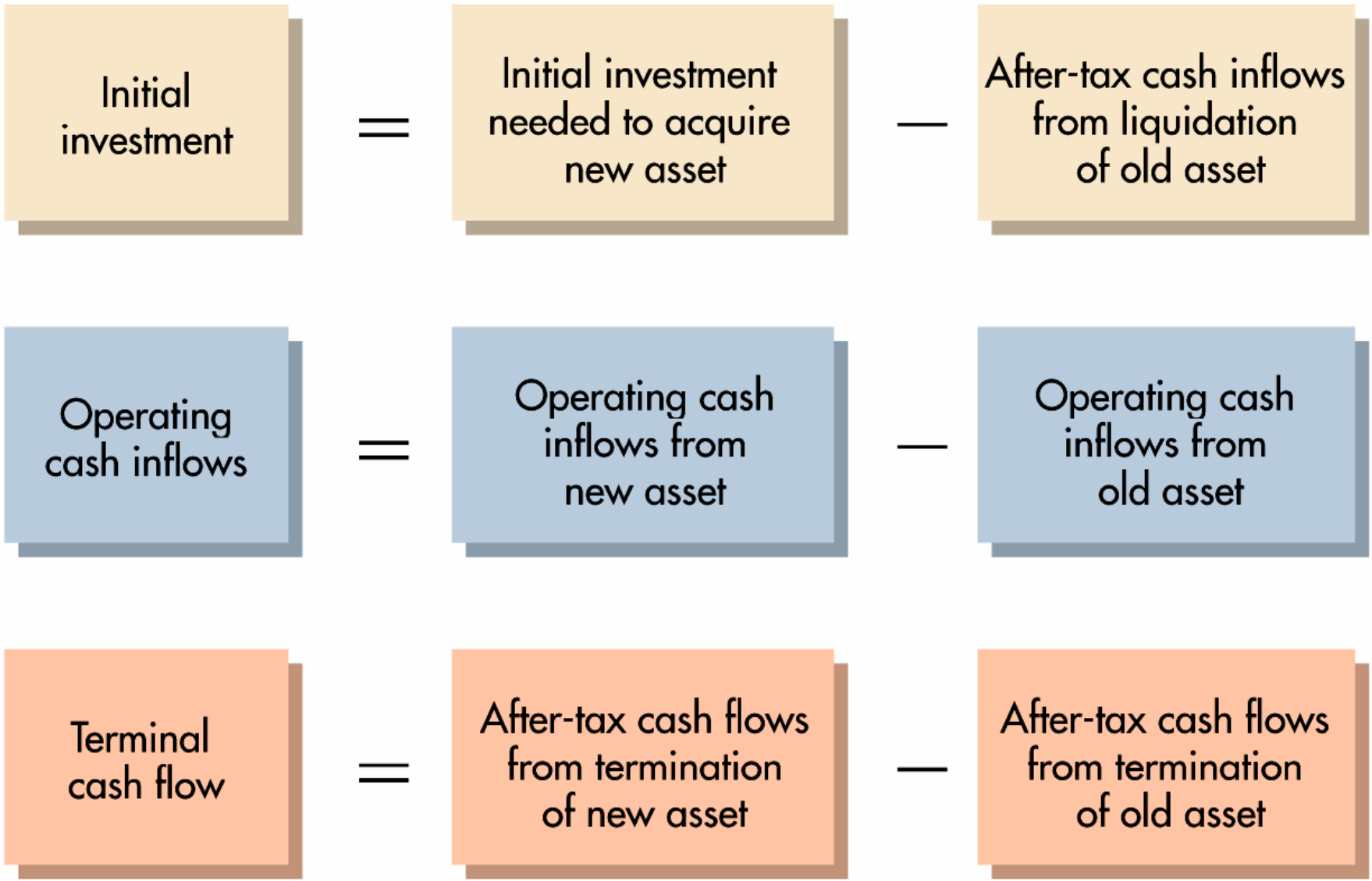
Relevant Cash Flows

- Incremental cash flows
  - only cash flows associated with the investment
  - effects on the firms other investments (both positive and negative) must also be considered
- Note that cash outlays already made (sunk costs) are irrelevant to the decision process.
- However, opportunity costs, which are cash flows that could be realized from the best alternative use of the asset, are relevant.

Relevant Cash Flows

- Incremental cash flows
  - only cash flows associated with the investment
  - effects on the firms other investments (both positive and negative) must also be considered
- Estimating incremental cash flows is relatively straightforward in the case of expansion projects, but not so in the case of replacement projects.
- With replacement projects, incremental cash flows must be computed by subtracting existing project cash flows from those expected from the new project.

Relevant Cash Flows



Relevant Cash Flows

- Examples of relevant cash flows:
  - cash inflows, outflows, and opportunity costs
  - changes in working capital
  - installation, removal and training costs
  - terminal values
  - depreciation
  - sunk costs
  - existing asset affects

Relevant Cash Flows

- Categories of Cash Flows:
  - Initial Cash Flows are cash flows resulting initially from the project. These are typically net negative outflows.
  - Operating Cash Flows are the cash flows generated by the project during its operation. These cash flows typically net positive cash flows.
  - Terminal Cash Flows result from the disposition of the project. These are typically positive net cash flows.

Estimating Cash Flows

Isolating Project Cash Flows

- To be properly evaluated, project cash flows should be viewed in isolation (“stand alone”).
- The “Stand alone” principle focuses on the project cash flows apart from any other firm cash flows.

Estimating Cash Flows

Influences on Project Cash Flows

- Incremental Cash Flows represent the difference between the firm's after-tax cash flows with the project and the firm's after-tax cash flows without the project.
- Cannibalization is the situation in which the cash flows gained from a project under consideration result in lost cash flows to existing projects.
- Enhancement or synergies result in additional cash flows to existing projects.
- Opportunity cost is the cost of passing up the next best alternative.

Estimating Cash Flows

Irrelevant Cash Flows

- Sunk Costs are not relevant to the analysis because these costs are not dependent on whether or not the project is undertaken.
- One example would be to include the cost of land already purchased as part of the decision as to how to develop it.
- Financing costs are not relevant to the determination of cash flows only because they are already accounted for through the discounting process.

Problems with Discounted Cash Flow Techniques

The Pattern of Cash Flows

- Most projects have a *conventional* pattern of cash flows (-,+,+,+,+,+,+).
- Some may have *unconventional* cash flows (-,-,+,+,-,+,-,+).
- For projects with unconventional cash flows, we may have the problem of *multiple IRRs.*

Problems with Discounted Cash Flow Techniques

Capital Rationing

- *Capital rationing* occurs whenever a company is constrained in its profitable (positive NPV) activities by a lack of funding.
- Smaller firms tend to face these obstacles more often because they have even more limited access to funds.
- One problem with NPV and IRR is that it is difficult to rank projects.
- In this case, the higher NPV should always be chosen.

International Capital Budgeting

- International capital budgeting analysis differs from purely domestic analysis because:
  - cash inflows and outflows occur in a foreign currency, and
  - foreign investments potentially face significant political risks
- despite these risk, the pace of foreign direct investment has accelerated significantly since the end of WWII.

Example

East Coast Drydock is considering replacing an existing hoist with one of two newer, more efficient pieces of equipment.

The existing hoist is 3 years old, cost $32,000, and is being depreciated using MACRS 5-year class rates. It has a remaining useful life of 5 years (8 total). New hoist A costs $40,000 plus $8,000 to install, a 5 year useful life, and will be depreciated under the 5-year MACRS class rates. Hoist B costs $54,000 to purchase, $6,000 to install, a 5-year life, and will also be depreciated under the 5-year MACRS class rates.

The replacement would require $4,000 in additional working capital for A, and $6,000 for B. The projected cash flows before depreciation and taxes with each alternative are provided in the following table:

Example

East Coast Drydock			
	Profits Before Depreciation & Taxes		
Year	Hoist A	Hoist B	Existing
1	$ 21,000	$ 22,000	$ 14,000
2	21,000	24,000	14,000
3	21,000	26,000	14,000
4	21,000	26,000	14,000
5	21,000	26,000	14,000

The existing hoist can be sold today for $18,000. After 5 years, the existing hoist could be sold for $1,000, A could be sold for 12,000, and B could be sold for $20,000 -- all before taxes. The firm is in the 40% tax bracket for both ordinary income and capital gains.

Example

Initial Investment Calculation

Depreciation on Old Hoist				
Year	Cost	MACRS	Dep. Exp.	Book Value
1	$ 32,000	20%	$ 6,400	$ 25,600
2	32,000	32%	10,240	$ 15,360
3	32,000	19%	6,080	$ 9,280
4	32,000	12%	3,840	$ 5,440
5	32,000	12%	3,840	$ 1,600
6	32,000	5%	1,600	$ -

Current Book Value of Old Hoist

Tax on Sale of Old	
Sale Price of Old	$ 18,000
Book Value of Old	9,280
Capital Gain (Loss)	$ 8,720
Tax Rate	40%
Capital Gain Tax	$ 3,488

Example

Initial Investment Calculation

Initial Investment		
	Hoist A	**Hoist B**
Installed cost of new asset	$ (40,000)	$ (54,000)
Installation costs	(8,000)	(6,000)
Total cost of new asset	$ (48,000)	$ (60,000)
Proceeds from sale of Old	$ 18,000	$ 18,000
Tax on sale of Old	(3,488)	(3,488)
Net proceeds (Old)	$ 14,512	$ 14,512
Change in NWC	$ (4,000)	$ (6,000)
Net initial Investment	$ (37,488)	$ (51,488)

Example

Depreciation Calculation

Depreciation for Hoist A				
Year	**Cost**	**MACRS**	**Dep. Exp.**	**Book Value**
1	$ 48,000	20%	$ 9,600	$ 38,400
2	$ 48,000	32%	$ 15,360	$ 23,040
3	$ 48,000	19%	$ 9,120	$ 13,920
4	$ 48,000	12%	$ 5,760	$ 8,160
5	$ 48,000	12%	$ 5,760	$ 2,400
6	$ 48,000	5%	$ 2,400	$ -

Depreciation for Hoist B				
Year	**Cost**	**MACRS**	**Dep. Exp.**	**Book Value**
1	$ 60,000	20%	$ 12,000	$ 48,000
2	$ 60,000	32%	$ 19,200	$ 28,800
3	$ 60,000	19%	$ 11,400	$ 17,400
4	$ 60,000	12%	$ 7,200	$ 10,200
5	$ 60,000	12%	$ 7,200	$ 3,000
6	$ 60,000	5%	$ 3,000	$ -

Example

Operating Cash Flow Calculation

Hoist A

After-Tax Operating Cash Flows: Hoist A						
	Profits before		Profits before		Profits After	After Tax
Year	Dep & Taxes	Deprec.	Taxes	Taxes	Taxes	Inflows
1	$ 21,000	$ 9,600	$ 11,400	$ 4,560	$ 6,840	$ 16,440
2	21,000	15,360	5,640	2,256	3,384	$ 18,744
3	21,000	9,120	11,880	4,752	7,128	$ 16,248
4	21,000	5,760	15,240	6,096	9,144	$ 14,904
5	21,000	5,760	15,240	6,096	9,144	$ 14,904
6	-	2,400	(2,400)	(960)	(1,440)	$ 960

Example

Operating Cash Flow Calculation

Hoist B

After-Tax Operating Cash Flows: Hoist B						
	Profits before		Profits before		Profits After	After Tax
Year	Dep & Taxes	Deprec.	Taxes	Taxes	Taxes	Inflows
1	$ 22,000	$12,000	$ 10,000	$ 4,000	$ 6,000	$ 18,000
2	24,000	19,200	4,800	1,920	2,880	$ 22,080
3	26,000	11,400	14,600	5,840	8,760	$ 20,160
4	26,000	7,200	18,800	7,520	11,280	$ 18,480
5	26,000	7,200	18,800	7,520	11,280	$ 18,480
6	-	3,000	(3,000)	(1,200)	(1,800)	$ 1,200

Example

Operating Cash Flow Calculation

Existing Hoist

After-Tax Operating Cash Flows: Existing Hoist						
	Profits before		Profits before		Profits After	After Tax
Year	Dep & Taxes	Deprec.	Taxes	Taxes	Taxes	Inflows
1	$ 14,000	$ 5,440	$ 8,560	$ 3,424	$ 5,136	$ 10,576
2	14,000	1,600	12,400	4,960	7,440	$ 9,040
3	14,000	-	14,000	5,600	8,400	$ 8,400
4	14,000	-	14,000	5,600	8,400	$ 8,400
5	14,000	-	14,000	5,600	8,400	$ 8,400
6	-	-	-	-	-	$ -

Example

Operating Cash Flow Calculation

Calculation of Incremental Operating Cash Flows					
				Incremental Cash Flow	
Year	Hoist A	Hoist B	Existing	Hoist A	Hoist B
1	$ 16,440	$ 18,000	$ 10,576	$ 5,864	$ 7,424
2	18,744	22,080	9,040	9,704	13,040
3	16,248	20,160	8,400	7,848	11,760
4	14,904	18,480	8,400	6,504	10,080
5	14,904	18,480	8,400	6,504	10,080
6	960	1,200	-	960	1,200

Example

Terminal Cash Flow Calculation

Terminal Cash Flow (Year 5)		
	Hoist A	**Hoist B**
Proceeds from sale of New	$ 12,000	$ 20,000
Book Value of New	2,400	3,000
Capital Gain (New)	9,600	17,000
Tax on sale of New	(3,840)	(6,800)
Net Proceeds (New)	$ 8,160	$ 13,200
Proceeds from sale of Old	$ 1,000	$ 1,000
Tax on sale of Old	(400)	(400)
Net proceeds (Old)	$ 600	$ 600
Change in NWC	$ 4,000	$ 6,000
Terminal Cash Flow	$ 12,760	$ 19,800

Example

Terminal Cash Flow Calculation

Year 5 Relevant Cash Flow		
	Hoist A	**Hoist B**
Operating Cash Flow	$ 6,504	$ 10,080
Terminal Cash Flow	12,760	19,800
Net Cash Flow	$ 19,264	$ 29,880

Example

Incremental Cash Flow Summary

East Coast Drydock			
Net Incremental After Tax Cash Flows			
Year	**Existing**	**Hoist A**	**Hoist B**
0	$ -	$ (37,488)	$ (51,488)
1	9,936	6,504	8,064
2	9,936	8,808	12,144
3	9,040	7,208	11,120
4	8,400	6,504	10,080
5	8,400	19,264	29,880

Some Complexities

- Inflation is typically adjusted for in the cash flow component of the calculation
- Taxes are typically adjusted for in the cash flow calculation, yielding net after-tax cash flows
- Risk is typically adjusted for in the discount rate portion of the calculation

A project's risk reflects the variability of a project's future cash flows. One must consider all factor's - both internal and external - that can impact an investment's risk. Once these risks have been identified, the risk adjusted discount rate is selected for the purpose of project evaluation.