Chapter 12

Capital Budgeting and Estimating Cash Flows

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Learning Objectives

After studying Chapter 12, you should be able to:

- Define "capital budgeting" and identify the steps involved in the capital budgeting process.
- Explain the procedure to generate long-term project proposals within the firm.
- Justify why cash, not income, flows are the most relevant to capital budgeting decisions.
- Summarize in a "checklist" the major concerns to keep in mind as one prepares to determine relevant capital budgeting cash flows.
- Define the terms "sunk cost" and "opportunity cost" and explain why sunk costs must be ignored, while opportunity costs must be included, in capital budgeting analysis.
- Explain how tax considerations, as well as depreciation for tax purposes, affects capital budgeting cash flows.
- Determine initial, interim, and terminal period "after-tax, incremental, operating cash flows" associated with a capital investment project.

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Topics

- The Capital Budgeting Process
- Generating Investment Project Proposals
- Estimating Project "After-Tax Incremental Operating Cash Flows"

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What is Capital Budgeting?

The process of identifying, analyzing, and selecting investment projects whose returns (cash flows) are expected to extend beyond one year.

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The Capital Budgeting Process

- Generate investment proposals consistent with the firm's strategic objectives.
- Estimate after-tax incremental operating cash flows for the investment projects.
- Evaluate project incremental cash flows.
- Select projects based on a value-maximizing acceptance criterion.
- Reevaluate implemented investment projects continually and perform post-audits for completed projects.

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Classification of Investment Project Proposals

1. New products or expansion of existing products
2. Replacement of existing equipment or buildings
3. Research and development
4. Exploration
5. Other (e.g., safety or pollution related)

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Screening Proposals and Decision Making

1. Section Chiefs
2. Plant Managers
3. VP for Operations
4. Capital Expenditures Committee
5. President
6. Board of Directors

Advancement to the next level depends on cost and strategic importance.

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Estimating After-Tax Incremental Cash Flows

Basic characteristics of relevant project flows

☑ Cash (not accounting income) flows
☑ Operating (not financing) flows
☑ After-tax flows
☑ Incremental flows

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Estimating After-Tax Incremental Cash Flows

Principles that must be adhered to in the estimation

- ☑ *Ignore* sunk costs
- ☑ *Include* opportunity costs
- ☑ *Include* project-driven changes in working capital net of spontaneous changes in current liabilities
- ☑ *Include* effects of inflation

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Tax Considerations and Depreciation

- ◆ Depreciation represents the systematic allocation of the cost of a capital asset over a period of time for financial reporting purposes, tax purposes, or both.

- • Generally, profitable firms prefer to use an accelerated method for tax reporting purposes (MACRS).

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Depreciation and the MACRS Method

- Everything else equal, the greater the depreciation charges, the lower the taxes paid by the firm.
- Depreciation is a noncash expense.
- Assets are depreciated (MACRS) on one of eight different property classes.
- Generally, the half-year convention is used for MACRS.

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MACRS Sample Schedule

Recovery	Property Class		
Year	3-Year	5-Year	7-Year
1	33.33%	20.00%	14.29%
2	44.45	32.00	24.49
3	14.81	19.20	17.49
4	7.41	11.52	12.49
5		11.52	8.93
6		5.76	8.92
7			8.93
8			4.46

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Depreciable Basis

In tax accounting, the fully installed cost of an asset. This is the amount that, by law, may be written off over time for tax purposes.

Depreciable Basis =

Cost of Asset + Capitalized Expenditures

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Capitalized Expenditures

Capitalized Expenditures are expenditures that may provide benefits into the future and therefore are treated as capital outlays and not as expenses of the period in which they were incurred.

Examples: Shipping and installation

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Sale or Disposal of a Depreciable Asset

◆ Generally, the sale of a "capital asset" (as defined by the IRS) generates a capital gain (asset sells for more than book value) or capital loss (asset sells for less than book value).

• Often historically, capital gains income has received more favorable U.S. tax treatment than operating income.

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Corporate Capital Gains / Losses

◆ Currently, capital gains are taxed at ordinary income tax rates for corporations, or a maximum 35%.

• Capital losses are deductible only against capital gains.

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Calculating the Incremental Cash Flows

- Initial cash outflow -- the initial net cash investment.
- Interim incremental net cash flows -- those net cash flows occurring after the initial cash investment but not including the final period's cash flow.
- Terminal-year incremental net cash flows -- the final period's net cash flow.

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Initial Cash Outflow

a)		*Cost of "new" assets*
b)	+	Capitalized expenditures
c)	+ (-)	Increased (decreased) NWC
d)	-	Net proceeds from sale of "old" asset(s) if replacement
e)	+ (-)	Taxes (savings) due to the sale of "old" asset(s) if replacement
f)	=	Initial cash *outflow*

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Incremental Cash Flows

a)		Net incr. (decr.) in operating revenue less (plus) any net incr. (decr.) in operating expenses, excluding depr.
b)	- (+)	Net incr. (decr.) in tax depreciation
c)	=	Net change in income before taxes
d)	- (+)	Net incr. (decr.) in taxes
e)	=	Net change in income after taxes
f)	+ (-)	Net incr. (decr.) in tax depr. charges
g)	=	Incremental net cash flow for period

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Terminal-Year Incremental Cash Flows

a)		Calculate the incremental net cash flow for the terminal period
b)	+ (-)	Salvage value (disposal/reclamation costs) of any sold or disposed assets
c)	- (+)	Taxes (tax savings) due to asset sale or disposal of "new" assets
d)	+ (-)	Decreased (increased) level of "net" working capital
e)	=	Terminal year incremental net cash flow

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Example of
an Asset Expansion Project

Basket Wonders (BW) is considering the purchase of a new basket weaving machine. The machine will cost $50,000 plus $20,000 for shipping and installation and falls under the 3-year MACRS class. NWC will rise by $5,000. Lisa Miller forecasts that revenues will increase by $110,000 for each of the next 4 years and will then be sold (scrapped) for $10,000 at the end of the fourth year, when the project ends. Operating costs will rise by $70,000 for each of the next four years. BW is in the 40% tax bracket.

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Initial Cash Outflow

a) $50,000
b)   +   20,000
c)   +   5,000
d)   -   0 (not a replacement)
e)   + (-) _____ 0 (not a replacement)
f)   = $75,000*

> *   Note that we have calculated this value as a "positive" because it is a cash OUTFLOW (negative).

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Incremental Cash Flows

		Year 1	Year 2	Year 3	Year 4
a)		$40,000	$40,000	$40,000	$40,000
b)	-	23,331	31,115	10,367	5,187
c)	=	$16,669	$ 8,885	$29,633	$34,813
d)	-	6,668	3,554	11,853	13,925
e)	=	$10,001	$ 5,331	$17,780	$20,888
f)	+	23,331	31,115	10,367	5,187
g)	=	$33,332	$36,446	$28,147	$26,075

Terminal-Year
Incremental Cash Flows

a)		$26,075	The incremental cash flow from the previous slide in Year 4.
b)	+	10,000	Salvage Value.
c)	-	4,000	.40*($10,000 - 0) Note, the asset is fully depreciated at the end of Year 4.
d)	+	5,000	NWC - Project ends.
e)	=	$37,075	Terminal-year incremental cash flow.

Summary of Project Net Cash Flows

Asset Expansion

Year 0	Year 1	Year 2	Year 3	Year 4
-$75,000*	$33,332	$36,446	$28,147	$37,075

* Notice again that this value is a _negative_ cash flow as we calculated it as the initial cash OUTFLOW.

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Summary of Project Net Cash Flows

Yr	BTCF	Depr.	Taxable	Tax	ATCF
0	-75000				-75000.0
1	40000	23331.0	16669.0	6667.6	33332.4
2	40000	31115.0	8885.0	3554.0	36446.0
3	40000	10367.0	29633.0	11853.2	28146.8
4	40000	5187.0	34813.0	13925.2	26074.8
4	5000				5000.0
4	10000		10000.0	4000.0	6000.0

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Example of
an Asset Replacement Project

Let us assume that previous asset expansion project is actually an asset replacement project. The original basis of the machine was $30,000 and depreciated using straight-line over five years ($6,000 per year). The machine has two years of depreciation and four years of useful life remaining. BW can sell the current machine for $6,000. The new machine will not increase revenues, but it decreases operating expenses by $10,000 per year. NWC will rise to $10,000 from $5,000 (old).

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Initial Cash Outflow

a)		$50,000	
b)	+	20,000	
c)	+	5,000	(Working capital)
d)	-	6,000	(Sale of "old" asset)
e)	-	2,400	<---- (tax savings from
f)	=	$66,600	loss (6000) on sale
			of "old" asset)

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Incremental Cash Flows

	Year 1	Year 2	Year 3	Year 4
a)	$10,000	$10,000	$10,000	$10,000
b) - Depr	23,331	31,115	10,367	5,187
c) =	$ -13,331	$-21,115	$ -367	$ 4,813
d) - Tax	-5,332	-8,446	-147	1,925
e) =	$ -7,999	$-12,669	$ -220	$ 2,888
f) +	23,331	31,115	10,367	5,187
g) =	**$15,332**	**$18,446**	**$10,147**	**$ 8,075**

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Terminal-Year
Incremental Cash Flows

a)		$ 8,075	The incremental cash flow in Year 4.
b)	+	10,000	Salvage Value.
c)	-	4,000	(.40)*($10,000 - 0). Note, the asset is fully depreciated at the end of Year 4.
d)	+	5,000	Return of "added" NWC.
e)	=	$19,075	Terminal-year incremental cash flow.

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Summary of Project Net Cash Flows

Asset Expansion

Year 0	Year 1	Year 2	Year 3	Year 4
-$75,000	$33,332	$36,446	$28,147	$37,075

Asset Replacement

Year 0	Year 1	Year 2	Year 3	Year 4
-$66,600	$15,332	$18,446	$10,147	$19,075

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Summary of Project Net Cash Flows

Yr	BTCF	Depr	Taxable	Tax	ATCF	
0	-66600				-66600.0	-66600.0
1	10000	23331	-13331	-5332.4	15332.4	15332.4
2	10000	31115	-21115	-8446.0	18446.0	18446.0
3	10000	10367	-367	-146.8	10146.8	10146.8
4	10000	5187	4813	1925.2	8074.8	19074.8
4	10000		10000	4000.0	6000.0	
4	5000				5000.0	

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