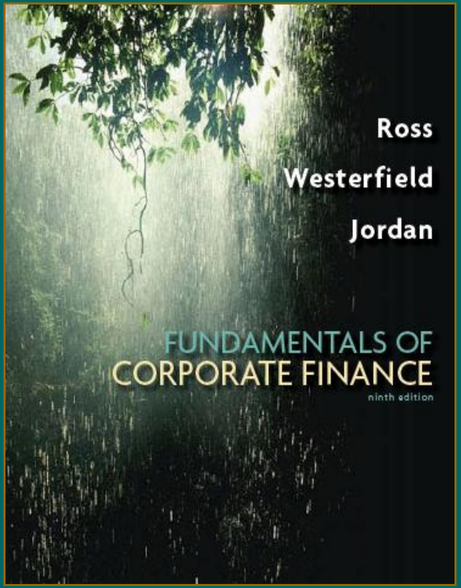

Chapter 10

Making Capital Investment Decisions

McGraw-Hill/Irwin

Key Concepts and Skills

- Understand how to determine the relevant cash flows for various types of proposed investments
- Understand the various methods for computing operating cash flow
- Understand how to set a bid price for a project
- Understand how to evaluate the equivalent annual cost of a project

Chapter Outline

- Project Cash Flows: A First Look
- Incremental Cash Flows
- Pro Forma Financial Statements and Project Cash Flows
- More about Project Cash Flow
- Alternative Definitions of Operating Cash Flow
- Some Special Cases of Discounted Cash Flow Analysis

Relevant Cash Flows

- The cash flows that should be included in a capital budgeting analysis are those that will only occur (or not occur) if the project is accepted
- These cash flows are called *incremental cash flows*
- The *stand-alone principle* allows us to analyze each project in isolation from the firm simply by focusing on incremental cash flows

Asking the Right Question

- You should always ask yourself "Will this cash flow occur ONLY if we accept the project?"
  - If the answer is "yes," it should be included in the analysis because it is incremental
  - If the answer is "no," it should not be included in the analysis because it will occur anyway
  - If the answer is "part of it," then we should include the part that occurs because of the project

Common Types of Cash Flows

- Sunk costs – costs that have accrued in the past
- Opportunity costs – costs of lost options
- Side effects
  - Positive side effects – benefits to other projects
  - Negative side effects – costs to other projects
- Changes in net working capital
- Financing costs
- Taxes

Pro Forma Statements and Cash Flow

- Capital budgeting relies heavily on pro forma accounting statements, particularly income statements
- Computing cash flows – refresher
  - Operating Cash Flow (OCF) = EBIT + depreciation – taxes
  - OCF = Net income + depreciation (when there is no interest expense)
  - Cash Flow From Assets (CFFA) = OCF – net capital spending (NCS) – changes in NWC

Table 10.1 Pro Forma Income Statement

Sales (50,000 units at $4.00/unit)	$200,000
Variable Costs ($2.50/unit)	125,000
Gross profit	$ 75,000
Fixed costs	12,000
Depreciation ($90,000 / 3)	30,000
EBIT	$ 33,000
Taxes (34%)	11,220
Net Income	$ 21,780

Table 10.2 Projected Capital Requirements

	Year			
	0	1	2	3
NWC	$20,000	$20,000	$20,000	$20,000
NFA	90,000	60,000	30,000	0
Total	$110,000	$80,000	$50,000	$20,000

Table 10.5 Projected Total Cash Flows

	Year			
	0	1	2	3
OCF		$51,780	$51,780	$51,780
Change in NWC	-$20,000			20,000
NCS	-$90,000			
CFFA	-$110,00	$51,780	$51,780	$71,780

Making The Decision

- Now that we have the cash flows, we can apply the techniques that we learned in Chapter 9
- Enter the cash flows into the calculator and compute NPV and IRR
  - CF_0 = -110,000; C01 = 51,780; F01 = 2; C02 = 71,780; F02 = 1
  - NPV; I = 20; CPT NPV = 10,648
  - CPT IRR = 25.8%
- ***Should we accept or reject the project?***

More on NWC

- Why do we have to consider changes in NWC separately?
  - GAAP requires that sales be recorded on the income statement when made, not when cash is received
  - GAAP also requires that we record cost of goods sold when the corresponding sales are made, whether we have actually paid our suppliers yet
  - Finally, we have to buy inventory to support sales, although we haven't collected cash yet

Depreciation

- The depreciation expense used for capital budgeting should be the depreciation schedule required by the IRS for tax purposes
- Depreciation itself is a non-cash expense; consequently, it is only relevant because it affects taxes
- Depreciation tax shield = DT
  - D = depreciation expense
  - T = marginal tax rate

Computing Depreciation

- Straight-line depreciation
  - D = (Initial cost – salvage) / number of years
  - Very few assets are depreciated straight-line for tax purposes
- MACRS
  - Need to know which asset class is appropriate for tax purposes
  - Multiply percentage given in table by the initial cost
  - Depreciate to zero
  - Mid-year convention

After-tax Salvage

- If the salvage value is different from the book value of the asset, then there is a tax effect
- Book value = initial cost – accumulated depreciation
- After-tax salvage = salvage – T(salvage – book value)

Example: Depreciation and After-tax Salvage

- You purchase equipment for $100,000, and it costs $10,000 to have it delivered and installed. Based on past information, you believe that you can sell the equipment for $17,000 when you are done with it in 6 years. The company’s marginal tax rate is 40%. What is the depreciation expense each year and the after-tax salvage in year 6 for each of the following situations?

Example: Straight-line

- Suppose the appropriate depreciation schedule is straight-line
  - D = (110,000 – 17,000) / 6 = 15,500 every year for 6 years
  - BV in year 6 = 110,000 – 6(15,500) = 17,000
  - After-tax salvage = 17,000 - .4(17,000 – 17,000) = 17,000

Example: Three-year MACRS

Year	MACRS percent	D
1	.3333	.3333(110,000) = 36,663
2	.4445	.4445(110,000) = 48,895
3	.1481	.1481(110,000) = 16,291
4	.0741	.0741(110,000) = 8,151

BV in year 6 = 110,000 – 36,663 – 48,895 – 16,291 – 8,151 = 0

After-tax salvage = 17,000 - .4(17,000 – 0) = $10,200

Example: Seven-Year MACRS

Year	MACRS Percent	D
1	.1429	.1429(110,000) = 15,719
2	.2449	.2449(110,000) = 26,939
3	.1749	.1749(110,000) = 19,239
4	.1249	.1249(110,000) = 13,739
5	.0893	.0893(110,000) = 9,823
6	.0892	.0892(110,000) = 9,812

BV in year 6 = 110,000 – 15,719 – 26,939 – 19,239 – 13,739 – 9,823 – 9,812 = 14,729

After-tax salvage = 17,000 – .4(17,000 – 14,729) = 16,091.60

Example: Replacement Problem

- Original Machine
  - Initial cost = 100,000
  - Annual depreciation = 9,000
  - Purchased 5 years ago
  - Book Value = 55,000
  - Salvage today = 65,000
  - Salvage in 5 years = 10,000
- New Machine
  - Initial cost = 150,000
  - 5-year life
  - Salvage in 5 years = 0
  - Cost savings = 50,000 per year
  - 3-year MACRS depreciation
- Required return = 10%
- Tax rate = 40%

Replacement Problem – Computing Cash Flows

- Remember that we are interested in incremental cash flows
- If we buy the new machine, then we will sell the old machine
- What are the cash flow consequences of selling the old machine today instead of in 5 years?

Replacement Problem – Pro Forma Income Statements

Year	1	2	3	4	5
Cost Savings	50,000	50,000	50,000	50,000	50,000
Depr.					
New	49,995	66,675	22,215	11,115	0
Old	9,000	9,000	9,000	9,000	9,000
Increm.	40,995	57,675	13,215	2,115	(9,000)
EBIT	9,005	(7,675)	36,785	47,885	59,000
Taxes	3,602	(3,070)	14,714	19,154	23,600
NI	5,403	(4,605)	22,071	28,731	35,400

Replacement Problem – Incremental Net Capital Spending

- Year 0
  - Cost of new machine = 150,000 (outflow)
  - After-tax salvage on old machine = 65,000 - .4(65,000 – 55,000) = 61,000 (inflow)
  - Incremental net capital spending = 150,000 – 61,000 = 89,000 (outflow)
- Year 5
  - After-tax salvage on old machine = 10,000 - .4(10,000 – 10,000) = 10,000 (outflow because we no longer receive this)

Replacement Problem – Cash Flow From Assets

Year	0	1	2	3	4	5
OCF		46,398	53,070	35,286	30,846	26,400
NCS	-89,000					-10,000
Δ In NWC	0					0
CFFA	-89,000	46,398	53,070	35,286	30,846	16,400

Replacement Problem – Analyzing the Cash Flows

- Now that we have the cash flows, we can compute the NPV and IRR
  - Enter the cash flows
  - Compute NPV = 54,801.74
  - Compute IRR = 36.28%
- ***Should the company replace the equipment?***

Other Methods for Computing OCF

- Bottom-Up Approach
  - Works only when there is no interest expense
  - OCF = NI + depreciation
- Top-Down Approach
  - OCF = Sales – Costs – Taxes
  - Don’t subtract non-cash deductions
- Tax Shield Approach
  - OCF = (Sales – Costs)(1 – T) + Depreciation*T

Example: Cost Cutting

- Your company is considering a new computer system that will initially cost $1 million. It will save $300,000 per year in inventory and receivables management costs. The system is expected to last for five years and will be depreciated using 3-year MACRS. The system is expected to have a salvage value of $50,000 at the end of year 5. There is no impact on net working capital. The marginal tax rate is 40%. The required return is 8%.
- Click on the Excel icon to work through the example

Example: Setting the Bid Price

- Consider the following information:
  - Army has requested bid for multiple use digitizing devices (MUDDs)
  - Deliver 4 units each year for the next 3 years
  - Labor and materials estimated to be $10,000 per unit
  - Production space leased for $12,000 per year
  - Requires $50,000 in fixed assets with expected salvage of $10,000 at the end of the project (depreciate straight-line)
  - Require initial $10,000 increase in NWC
  - Tax rate = 34%
  - Required return = 15%

Example: Equivalent Annual Cost Analysis

- Burnout Batteries
  - Initial Cost = $36 each
  - 3-year life
  - $100 per year to keep charged
  - Expected salvage = $5
  - Straight-line depreciation
- Long-lasting Batteries
  - Initial Cost = $60 each
  - 5-year life
  - $88 per year to keep charged
  - Expected salvage = $5
  - Straight-line depreciation

The machine chosen will be replaced indefinitely and neither machine will have a differential impact on revenue. No change in NWC is required.

The required return is 15%, and the tax rate is 34%.

Quick Quiz

- How do we determine if cash flows are relevant to the capital budgeting decision?
- What are the different methods for computing operating cash flow and when are they important?
- What is the basic process for finding the bid price?
- What is equivalent annual cost and when should it be used?

Ethics Issues

- In an L.A. Law episode, an automobile manufacturer knowingly built cars that had a significant safety flaw. Rather than redesigning the cars (at substantial additional cost), the manufacturer calculated the expected costs of future lawsuits and determined that it would be cheaper to sell an unsafe car and defend itself against lawsuits than to redesign the car. What issues does the financial analysis overlook?

Comprehensive Problem

- A $1,000,000 investment is depreciated using a seven-year MACRS class life. It requires $150,000 in additional inventory and will increase accounts payable by $50,000. It will generate $400,000 in revenue and $150,000 in cash expenses annually, and the tax rate is 40%. What is the incremental cash flow in years 0, 1, 7, and 8?

End of Chapter