

Project Analysis

F305 Intermediate Corporate Finance

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Slide Set A5 – Capital Investments

Overview

- Evaluating NPV Estimates
- Scenario and Other What-If Analyses
- Break-Even Analysis
- Operating Cash Flow, Sales Volume, and Break-Even
- Operating Leverage
- Capital Rationing

Evaluating NPV Estimates

The Truth About NPV Estimates

“Estimates” are a fancy name for “guesses”

Just about every input in our NPV estimate is going to be a guess:

- Sales (both volume and price)
- Costs (both variable and fixed)
- Taxes
- Interest Rate

In this chapter, we’re trying to figure out how much the error of guessing matters in terms of our decision to go ahead with the project.

- Or, put another way, how “off” do our guesses have to be in order for our decision to be wrong.

Scenario and Other What-If Analyses

Scenario Analysis vs. Sensitivity Analysis

Scenario Analysis

- Sets up a limited number of possible “situations” where multiple correlated inputs could change together

Sensitivity Analysis

- Measure sensitivity of output you care about (NPV? Net Income?) to selected inputs one at a time
 - Idea is that you can then either refine your guesses or “bound” the possible errors

Revisiting Sample Project 10-2

You are evaluating a project for The Farstroke golf club, guaranteed to correct that nasty slice. You estimate the sales price of The Farstroke to be \$400 per unit and sales volume to be 1,000 units in year 1; 1,500 units in year 2; and 1,325 units in year 3. The project has a three-year life. Variable costs amount to \$225 per unit and fixed costs are \$100,000 per year. The project requires an initial investment of \$165,000 in assets, which can be depreciated using SL depreciation (with the half-year assumption). The actual market value of these assets at the end of year 3 is expected to be \$35,000. NWC requirements at the beginning of each year will be approximately 20 percent of the projected sales during the coming year. The tax rate is 21 percent and the required return on the project is 10 percent. What change in NWC occurs at the end of year 1? What is the operating cash flow for the project in year 2?

| | | | | | | | |
|----|---|---------------|---------------|---------------|---------------|--------|--------|
| 3 | Project Evaluation | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| 4 | Estimated Unit Sales | | 1,000 | 1,500 | 1,325 | | |
| 5 | Estimated Selling Price per Unit | | \$ 400.00 | \$ 400.00 | \$ 400.00 | | |
| 6 | Estimated Variable Cost per Unit | | \$ 225.00 | \$ 225.00 | \$ 225.00 | | |
| 7 | Estimated Fixed Costs | | \$ 100,000.00 | \$ 100,000.00 | \$ 100,000.00 | | |
| 8 | | | | | | | |
| 9 | Yearly Levels of NWC | \$ 80,000.00 | 120,000.00 | 106,000.00 | 0.00 | | |
| 10 | | | | | | | |
| 11 | Depreciable Basis of Initial Investment in Fixed Assets | \$ 165,000.00 | | | | | |
| 12 | Type of Depreciation | SL | | | | | |
| 13 | Class Life | 3 | | | | | |
| 14 | Salvage Value | \$ 35,000.00 | | | | | |
| 15 | | | | | | | |
| 16 | Tax Rate | 21% | | | | | |
| 17 | Cost of Capital | 10% | | | | | |
| 18 | | | | | | | |
| 19 | Year | 0 | 1 | 2 | 3 | 4 | 5 |
| 20 | Sales | \$0.00 | \$400,000.00 | \$600,000.00 | \$530,000.00 | \$0.00 | \$0.00 |
| 21 | - Fixed Costs | \$0.00 | -\$100,000.00 | -\$100,000.00 | -\$100,000.00 | \$0.00 | \$0.00 |
| 22 | - Variable Costs | \$0.00 | -\$225,000.00 | -\$337,500.00 | -\$298,125.00 | \$0.00 | \$0.00 |
| 23 | - Depreciation | \$0.00 | -\$27,505.50 | -\$54,994.50 | -\$54,994.50 | \$0.00 | \$0.00 |
| 24 | EBIT | \$0.00 | \$47,494.50 | \$107,505.50 | \$76,880.50 | \$0.00 | \$0.00 |
| 25 | - Taxes | \$0.00 | -\$9,973.85 | -\$22,576.16 | -\$16,144.91 | \$0.00 | \$0.00 |
| 26 | "Net Income" | \$0.00 | \$37,520.66 | \$84,929.35 | \$60,735.60 | \$0.00 | \$0.00 |
| 27 | + Depreciation | \$0.00 | \$27,505.50 | \$54,994.50 | \$54,994.50 | \$0.00 | \$0.00 |
| 28 | OCF | \$0.00 | \$65,026.16 | \$139,923.85 | \$115,730.10 | \$0.00 | \$0.00 |
| 29 | -ΔNWC | -\$80,000.00 | -\$40,000.00 | \$14,000.00 | \$106,000.00 | \$0.00 | \$0.00 |
| 30 | -ΔFA | -\$165,000.00 | \$0.00 | \$0.00 | \$33,426.16 | \$0.00 | \$0.00 |
| 31 | Total Cash Flow | -\$245,000.00 | \$25,026.16 | \$153,923.85 | \$255,156.25 | \$0.00 | \$0.00 |
| 32 | | | | | | | |
| 33 | NPV | \$96,663.51 | | | | | |

Break-Even Analysis

Break-Even Analysis

Figure out how much one particular input has to change to make the go/no-go decision (NPV? Net Income?) change

Operating Cash Flow, Sales Volume, and Break-Even

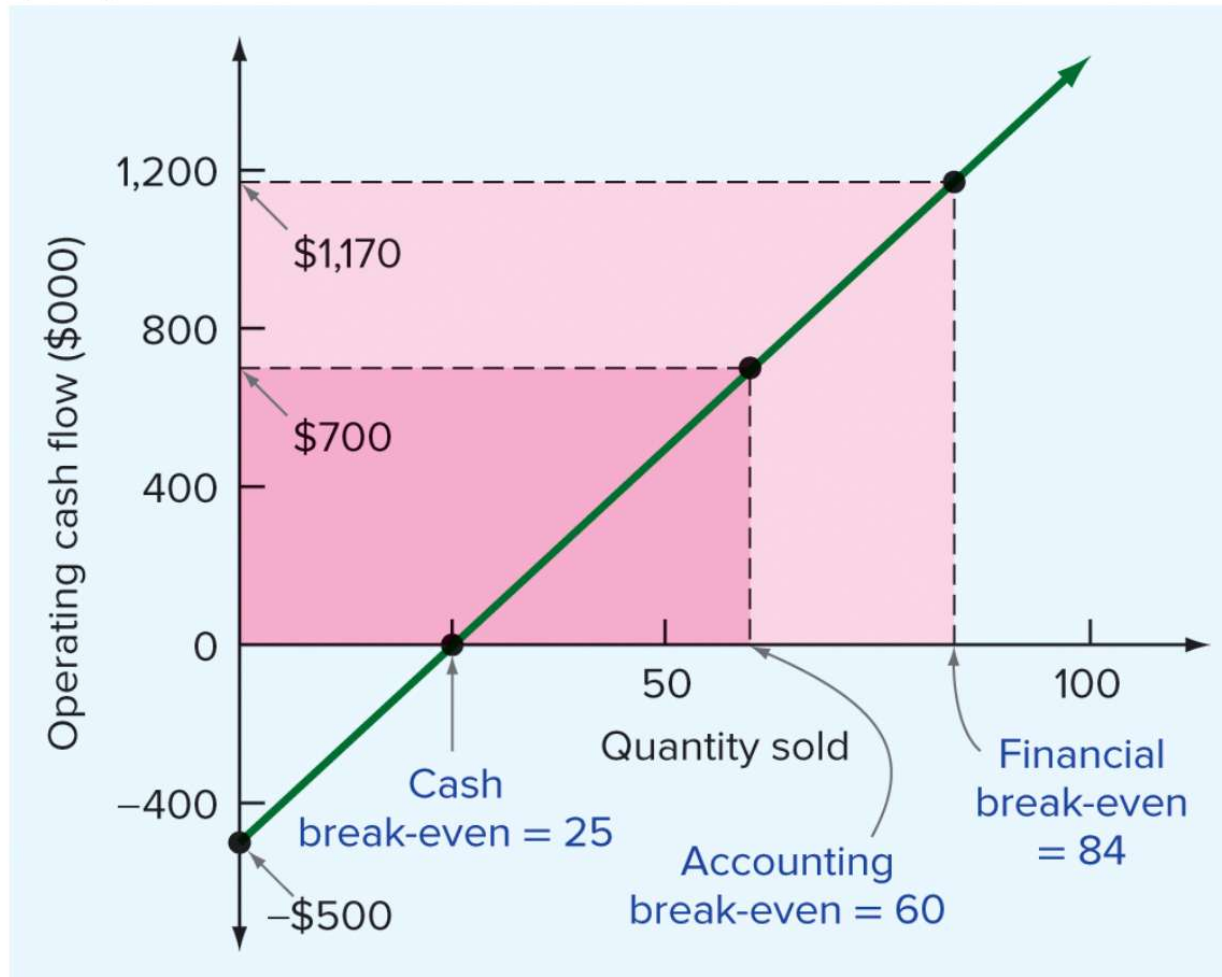
Westway Sailboat Corporation Example from Textbook

Westway Sailboat Corporation is considering whether to launch its new Margo-class sailboat. The selling price will be \$40,000 per boat, variable costs will be \$20,000 per boat, and fixed costs will be \$500,000 per year. Total investment needed to undertake the project is \$3,500,000, which will be depreciated straight-line to zero over the five-year life of the equipment. The salvage value is zero, and there are no working capital consequences. The required return is 20%.

Westway projects total sales for the five years at 425 boats, or about 85 boats per year. Ignoring taxes, should this project be launched?

FIGURE 11.5

Operating Cash Flow and Sales Volume



| | A | B | C | D | E | F | G |
|----|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 3 | Project Evaluation | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| 4 | Estimated Unit Sales | | 85 | 85 | 85 | 85 | 85 |
| 5 | Estimated Selling Price per Unit | | \$ 40,000.00 | \$ 40,000.00 | \$ 40,000.00 | \$ 40,000.00 | \$ 40,000.00 |
| 6 | Estimated Variable Cost per Unit | | \$ 20,000.00 | \$ 20,000.00 | \$ 20,000.00 | \$ 20,000.00 | \$ 20,000.00 |
| 7 | Estimated Fixed Costs | | \$ 500,000.00 | \$ 500,000.00 | \$ 500,000.00 | \$ 500,000.00 | \$ 500,000.00 |
| 8 | | | | | | | |
| 9 | Yearly Levels of NWC | | | | | | |
| 10 | | | | | | | |
| 11 | Depreciable Basis of Initial Investment in Fixed Assets | \$ 3,500,000.00 | | | | | |
| 12 | Type of Depreciation | SLNoHalf | | | | | |
| 13 | Class Life | 5 | | | | | |
| 14 | Salvage Value | \$ - | | | | | |
| 15 | | | | | | | |
| 16 | Tax Rate | 0% | | | | | |
| 17 | Cost of Capital | 20% | | | | | |
| 18 | | | | | | | |
| 19 | Year | 0 | 1 | 2 | 3 | 4 | 5 |
| 20 | Sales | \$0.00 | \$3,400,000.00 | \$3,400,000.00 | \$3,400,000.00 | \$3,400,000.00 | \$3,400,000.00 |
| 21 | - Fixed Costs | \$0.00 | -\$500,000.00 | -\$500,000.00 | -\$500,000.00 | -\$500,000.00 | -\$500,000.00 |
| 22 | - Variable Costs | \$0.00 | -\$1,700,000.00 | -\$1,700,000.00 | -\$1,700,000.00 | -\$1,700,000.00 | -\$1,700,000.00 |
| 23 | - Depreciation | \$0.00 | -\$700,000.00 | -\$700,000.00 | -\$700,000.00 | -\$700,000.00 | -\$700,000.00 |
| 24 | EBIT | \$0.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 |
| 25 | - Taxes | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 26 | "Net Income" | \$0.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 | \$500,000.00 |
| 27 | + Depreciation | \$0.00 | \$700,000.00 | \$700,000.00 | \$700,000.00 | \$700,000.00 | \$700,000.00 |
| 28 | OCF | \$0.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 |
| 29 | -ΔNWC | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 30 | -ΔFA | -\$3,500,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 31 | Total Cash Flow | -\$3,500,000.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 | \$1,200,000.00 |
| 32 | | | | | | | |
| 33 | NPV | \$88,734.57 | | | | | |

Operating Leverage

The Degree of Operating Leverage (DOL)

Operating leverage is the degree to which a firm or project relies on fixed costs.

- A firm with low operating leverage will have low fixed costs compared to a firm with high operating leverage.
- Projects with a relatively heavy investment in plant and equipment will have a relatively high degree of operating leverage, and these projects are said to be *capital intensive*.

DOL Implications for Project Valuation

Operating leverage has important implications for project evaluation.

- Fixed costs act as a lever in the sense that a small percentage change in operating revenue can be magnified into a large percentage change in operating cash flow and NPV.
- The higher the degree of operating leverage, the greater is the potential danger from forecasting risk.

Measuring DOL

We can measure DOL as:

$$DOL = 1 + \frac{FC}{OCF}$$

Note that this measurement pertains to a particular “starting point” of quantity being produced.

DOL Example: Sasha Corp (from Textbook)

The Sasha Corp. currently sells gourmet dog food for \$1.20 per can. The variable cost is 80 cents per can, and the packaging and marketing operations have fixed costs of \$360,000 per year. Depreciation is \$60,000 per year. What is the accounting break-even? Ignoring taxes, what will be the increase in operating cash flow if the quantity sold rises to 10 percent above the break-even point?

| | A | B | C | D | E | F | G |
|----|---|--------------|----------------|--------|--------|--------|--------|
| 1 | Reset | Reset | | | | | |
| 2 | | | | | | | |
| 3 | Project Evaluation | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| 4 | Estimated Unit Sales | | 1,050,000 | | | | |
| 5 | Estimated Selling Price per Unit | | \$ 1.20 | | | | |
| 6 | Estimated Variable Cost per Unit | | \$ 0.80 | | | | |
| 7 | Estimated Fixed Costs | | \$ 360,000.00 | | | | |
| 8 | | | | | | | |
| 9 | Yearly Levels of NWC | | | | | | |
| 10 | | | | | | | |
| 11 | Depreciable Basis of Initial Investment in Fixed Assets | \$ 60,000.00 | | | | | |
| 12 | Type of Depreciation | SLNoHalf | | | | | |
| 13 | Class Life | 0 | | | | | |
| 14 | Salvage Value | \$ - | | | | | |
| 15 | | | | | | | |
| 16 | Tax Rate | | | | | | |
| 17 | Cost of Capital | | | | | | |
| 18 | | | | | | | |
| 19 | Year | 0 | 1 | 2 | 3 | 4 | 5 |
| 20 | Sales | \$0.00 | \$1,260,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 21 | - Fixed Costs | \$0.00 | -\$360,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 22 | - Variable Costs | \$0.00 | -\$840,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 23 | - Depreciation | \$0.00 | -\$60,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 24 | EBIT | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 25 | - Taxes | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 26 | "Net Income" | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 27 | + Depreciation | \$0.00 | \$60,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 28 | OCF | \$0.00 | \$60,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 29 | -ΔNWC | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 30 | -ΔFA | -\$60,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 31 | Total Cash Flow | -\$60,000.00 | \$60,000.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 |
| 32 | | | | | | | |
| 33 | NPV | \$0.00 | | | | | |

Capital Rationing

Capital Rationing

Capital rationing exists if a firm has positive NPV projects but cannot find the necessary financing.

- **Soft rationing** occurs when units in a business are allocated a certain amount of financing for capital budgeting.
- Corporation as a whole is not short of capital; more can be raised on ordinary terms if management so desires.
- In the face of soft rationing, try to get a larger allocation. If a larger allocation is not awarded, generate as large a NPV as possible within the existing budget.

Hard rationing occurs when a business cannot raise financing for a project under any circumstances.

- DCF analysis breaks down when hard rationing occurs.
- Can occur when a company experiences financial distress or if the firm is unable to raise capital without violating a preexisting contractual agreement.

Up Next

Exam 1