Capital Budgeting

Relevant Incremental Cash Flows

- Shipping and Installation
- Noncash Items
  - depreciation & amortization
  - accounting allocations
- Interest Expense
- Sunk Costs
- Opportunity Costs
- Side Effects (product cannibalization)

Free Cash Flow (FCF)

- FCF =
  - Cash flow available to _____ after _____ in fixed assets and working capital

Uses of Free Cash Flow (FCF)

1.
2.
3.
4.
5.

Depreciation

- Straight-line
- MACRS

Straight-Line Depreciation

- You purchase a machine for $20,000, which has a depreciable life of 5 years. What is the annual depreciation expense?
- If you sell the machine at the end of the year 4 for $5,000, what is the after-tax salvage value if the firm's tax rate is 40 percent?

MACRS Depreciation

- Half-year convention
- Table 6.3

MACRS Depreciation

	Asset Class	
Year	3-Year	5-Year
1	33.33%	20.00%
2	44.45%	32.00%
3	14.81%	19.20%
4	7.41%	11.52%
5		11.52%
6		5.76%

MACRS Depreciation

- You purchase a machine for $80,000, which is in the 3-year asset class. The machine costs an additional $20,000 in delivery and installation. Create a depreciation schedule.

MACRS Depreciation

- If you sell the machine at the end of year 3 for $5,000, what is the after-tax salvage value if the firm's tax rate is 40 percent?

Example #1

The Effing House Family Restaurant, Inc. is considering producing and selling Effing Waffle Irons. Plans are to keep the items on the market for 5 years. Last year, they spent $20,000 on a market study to determine the appropriate price would be $20 per iron. They expect sales to be 10,000 units in each year after. Costs are expected to be 20% of sales, and the firm's marginal tax rate is 40%. In addition, they must purchase an iron manufacturing machine for $500,000, which is depreciated using the straight-line method and worthless at the end of the project. Due to an increase in inventories, net working capital is expected to increase by $15,000. If the required return on this project is 10%, should they introduce the new product?

Example #2

Norfolk and Waypal, Inc. is considering a project that will last 4 years and produce annual sales of 1,250 units at an initial price of $200 per unit. The initial cost to produce each unit is $100. Assume that price and cost increase at 3 percent per year after the first year. The firm requires net operating working capital to be 12 percent of next year's sales and has a 40 percent marginal tax rate. The project requires machinery costing $200,000, plus an additional $10,000 for shipping and $30,000 for installation. It is in the MACRS 3-year asset class and is expected to have a $25,000 salvage value before taxes at the end of the project. Projects of this risk have a 10 percent cost of capital. In addition, the firm spent $100,000 last year to improve the production line site. Should they invest?

Risk Analysis

- Sensitivity Analysis
- Scenario Analysis
- Simulation Analysis
- Phased Decisions

- Types of Risk
  - Stand-alone risk
  - Corporate or firm risk
  - Market risk

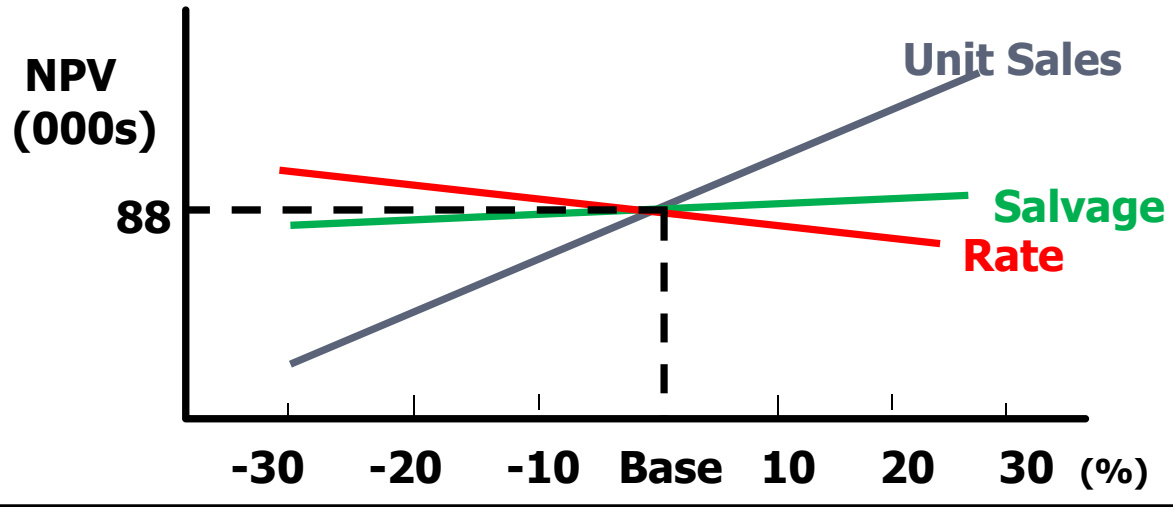
Sensitivity Analysis

- What happens to NPV if we change a _____ variable?
- For a particular input, evaluate a base case and then deviations from the base case.

Sensitivity Analysis

Change From Base level	Resulting NPV (000s)		
	Rate	Unit sales	Salvage
-30%	$113	$17	$85
-15%	$100	$52	$86
0%	$88	$88	$88
15%	$76	$124	$90
30%	$65	$159	$91

Sensitivity Analysis



Sensitivity Analysis

- Pros
  - Gives some idea of stand-alone risk.
  - Identifies dangerous variables.
  - Gives some breakeven information.
- Cons
  - Does not reflect diversification.
  - Says nothing about the likelihood of change in a variable.
  - Ignores relationships among variables.

Scenario Analysis

- Incorporates the _____ of changes in our inputs
- Allows more than _____ to be changed at a time

Best scenario: 1,600 units @ $240
Worst scenario: 900 units @ $160

Scenario	Probability	NPV(000)
Best	0.25	$279
Base	0.50	$88
Worst	0.25	-$49
		E(NPV) = $101.5
		σ(NPV) = 116.6

Scenario Analysis

- Pros
  - Gives some idea of stand-alone risk.
  - Incorporates the probability of outcomes.
  - Allows more than one input to be changed simultaneously.
- Cons
  - Only considers a few possible out-comes.
  - Assumes that inputs are perfectly correlated.
  - Focuses on stand-alone risk.

Simulation Analysis

- A computerized version of scenario analysis that uses continuous probability distributions.
- Computer selects values for each variable based on given probability distributions.
- NPV and IRR are calculated.
- Process is repeated many times (1,000 or more).
- End result: Probability distribution of NPV and IRR based on sample of simulated values.
- Generally shown with a graph.

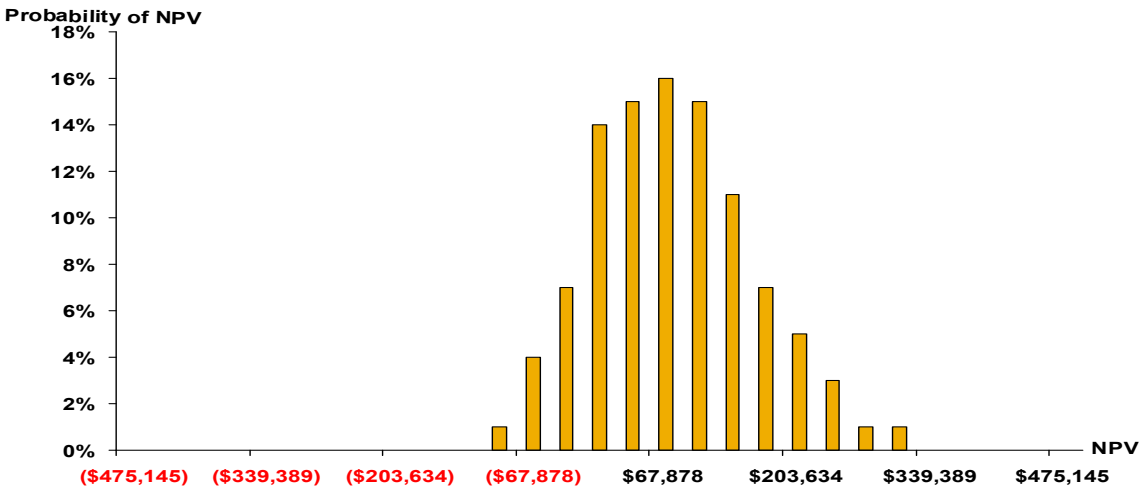
Simulation Example Assumptions

- Normal distribution for unit sales:
  - Mean = 1,250
  - Standard deviation = 200
- Normal distribution for unit price:
  - Mean = $200
  - Standard deviation = $30

Simulation Results (2,000 trials)

	Units	Price	NPV
Mean	1,252	$200	$88,808
Std deviation	199	30	$82,519
Maximum	1,927	294	$475,145
Minimum	454	94	-$166,208
Median	685	$163	$84,551
Prob NPV > 0			86.9%

Histogram of Results



Simulation Analysis

- Pros
  - Reflects the probability distributions of each input.
  - Shows range of NPVs, E(NPV), and σ_{NPV}.
  - Gives an intuitive graph of the risk situation.
- Cons
  - Difficult to specify probability distributions and correlations.
  - "Garbage in, garbage out."

All 3 Analyses

- Ignore _____
- Now what?

Phased-Decisions

- Create a decision tree
- Re-evaluate project at key points
- Proceed or end project?

Inflation

- Use a nominal discount rate with nominal cash flows
- Use a real discount rate with real cash flows
- $(1+r_n) = (1+r_r) \times (1+i)$
- $r_n = r_r + i + (r_r \times i)$

Example #3

Yost Rocks, Inc. is a landscape supply company based in Boring, Oregon. The firm purchased a machine 5 years ago at a cost of $90,000. It had an expected life of 10 years at the time of purchase and an expected salvage value of $10,000 at the end of 10 years. It is being depreciated by the straight line method to zero, or by $9,000 per year. A new machine can be purchased for $150,000, including installation costs. Over its 5-year life, it will reduce cash operating expenses by $50,000 per year. Sales are not expected to change. At the end of its useful life, the machine is estimated to be worthless. MACRS depreciation will be used, and it will be depreciated over a 3-year recovery period rather than its 5-year economic life.

The old machine can be sold today for $65,000. The firm's tax rate is 34 percent. The appropriate discount rate is 15 percent. Should Yost Rocks, Inc. purchase the new machine now?

Chapters 6 and 7 Suggested Problems

- Concept Questions
  - Chapter 6: 1, 2, 3, 4, 5, and 9
  - Chapter 7: 1, 2, and 8
- Questions and Problems
  - Chapter 6: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, and 24
  - Chapter 7: none