

CHAPTER 11

Cash Flow Estimation and Risk Analysis

- Relevant cash flows
- Incorporating inflation
- Types of risk
- Risk Analysis

11-1

Proposed Project

- Total depreciable cost
 - Equipment: \$200,000
 - Shipping: \$10,000
 - Installation: \$30,000
- Changes in working capital
 - Inventories will rise by \$25,000
 - Accounts payable will rise by \$5,000
- Effect on operations
 - New sales: 100,000 units/year @ \$2/unit
 - Variable cost: 60% of sales

11-2

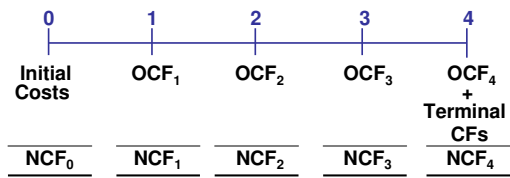
Proposed Project

- Life of the project
 - Economic life: 4 years
 - Depreciable life: MACRS 3-year class
 - Salvage value: \$25,000
- Tax rate: 40%
- WACC: 10%

11-3

Determining project value

- Estimate relevant cash flows
 - Calculating annual operating cash flows.
 - Identifying changes in working capital.
 - Calculating terminal cash flows.



11-4

Initial year net cash flow

- Find Δ NOWC.
 - \square in inventories of \$25,000
 - Funded partly by an \square in A/P of \$5,000
 - Δ NOWC = \$25,000 - \$5,000 = \$20,000
- Combine Δ NOWC with initial costs.

Equipment	-\$200,000
Installation	-40,000
Δ NOWC	<u>-20,000</u>
Net CF ₀	<u><u>-\$260,000</u></u>

11-5

Determining annual depreciation expense

Year	Rate	x	Basis	Depr
1	0.33	x	\$240	\$ 79
2	0.45	x	240	108
3	0.15	x	240	36
4	0.07	x	240	17
	<u>1.00</u>			<u>\$240</u>

Due to the MACRS $\frac{1}{2}$ -year convention, a 3-year asset is depreciated over 4 years.

11-6

Annual operating cash flows

	1	2	3	4
Revenues	200	200	200	200
- Op. Costs (60%)	-120	-120	-120	-120
- Deprn Expense	-79	-108	-36	-17
Oper. Income (BT)	1	-28	44	63
- Tax (40%)	-	-11	18	25
Oper. Income (AT)	1	-17	26	38
+ Deprn Expense	79	108	36	17
Operating CF	80	91	62	55

11-7

Terminal net cash flow

Recovery of NOWC	\$20,000
Salvage value	25,000
Tax on SV (40%)	-10,000
Terminal CF	<u>\$35,000</u>

- Q. How is NOWC recovered?
 Q. Is there always a tax on SV?
 Q. Is the tax on SV ever a positive cash flow?

11-8

Should financing effects be included in cash flows?

No, dividends and interest expense should not be included in the analysis. Financing effects have already been taken into account by discounting cash flows at the WACC of 10%.
 Deducting interest expense and dividends would be "double counting" financing costs.

11-9

Should a \$50,000 improvement cost from the previous year be included in the analysis?

No, the building improvement cost is a sunk cost and should not be considered.
 This analysis should only include incremental investment.

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If the facility could be leased out for \$25,000 per year, would this affect the analysis?

Yes, by accepting the project, the firm foregoes a possible annual cash flow of \$25,000, which is an opportunity cost to be charged to the project.

The relevant cash flow is the annual after-tax opportunity cost.

$$\begin{aligned} \text{A-T opportunity cost} &= \$25,000 (1 - T) \\ &= \$25,000(0.6) \\ &= \$15,000 \end{aligned}$$

11-11

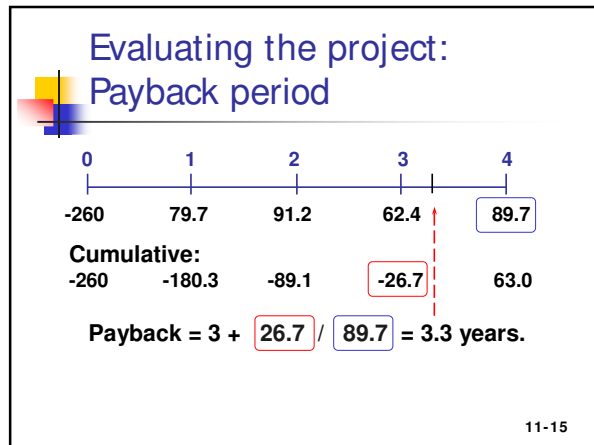
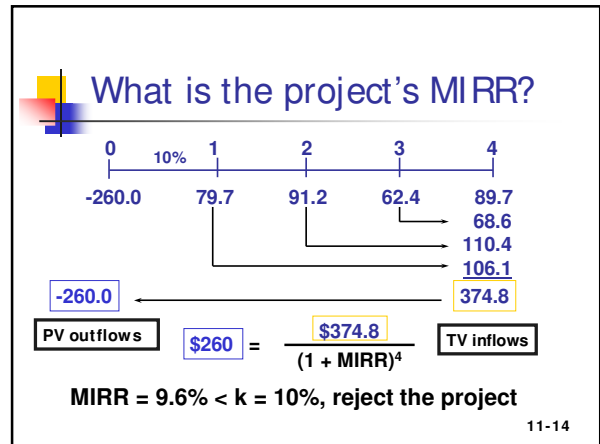
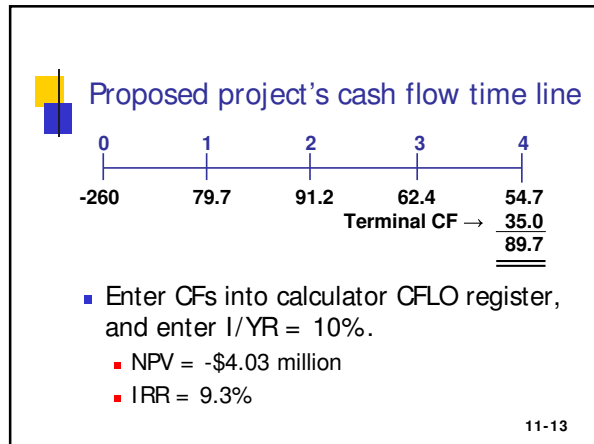
If the new product line were to decrease the sales of the firm's other lines, would this affect the analysis?

Yes. The effect on other projects' CFs is an "externality."

Net CF loss per year on other lines would be a cost to this project.

Externalities can be positive (in the case of complements) or negative (substitutes).

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What if there is expected annual inflation of 5%, is NPV biased?

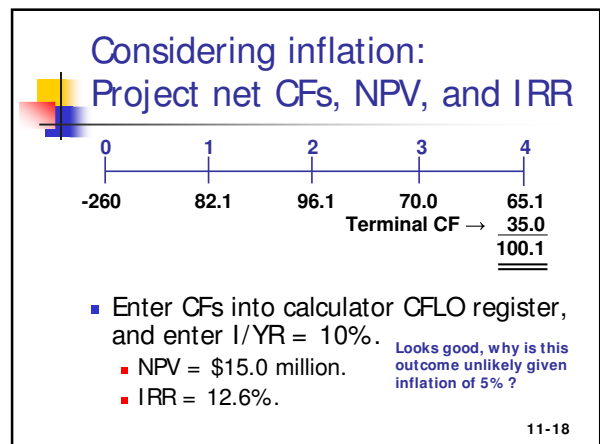
- Yes, inflation causes the discount rate to be upwardly revised.
- Therefore, inflation creates a downward bias on PV.
- Inflation should be built into CF forecasts.

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Annual operating cash flows, if expected annual inflation = 5%

	1	2	3	4
Revenues	210	220	232	243
Op. Costs (60%)	-126	-132	-139	-146
- Deprn Expense	-79	-108	-36	-17
- Oper. Income (BT)	5	-20	57	80
- Tax (40%)	2	-8	23	32
Oper. Income (AT)	3	-12	34	48
+ Deprn Expense	79	108	36	17
Operating CF	82	96	70	65

11-17



What are the 3 types of project risk?

- Stand-alone risk
- Corporate risk
- Market risk

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What is stand-alone risk?

- The project's total risk, if it were operated independently.
- Usually measured by standard deviation (or coefficient of variation).
- However, it ignores the firm's diversification among projects and investor's diversification among firms.

11-20

What is corporate risk?

- The project's risk when considering the firm's other projects, i.e., diversification within the firm.
- Corporate risk is a function of the project's NPV and standard deviation and its correlation with the returns on other projects in the firm.

11-21

What is market risk?

- The project's risk to a well-diversified investor.
- Theoretically, it is measured by the project's beta and it considers both corporate and stockholder diversification.

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Which type of risk is most relevant?

- Market risk is the most relevant risk for capital projects, because management's primary goal is shareholder wealth maximization.
- However, since total risk affects creditors, customers, suppliers, and employees, it should not be completely ignored.

11-23

Which risk is the easiest to measure?

- Stand-alone risk is the easiest to measure. Firms often focus on stand-alone risk when making capital budgeting decisions.
- Focusing on stand-alone risk is not theoretically correct, but it does not necessarily lead to poor decisions.

11-24

Are the three types of risk generally highly correlated?

- Yes, since most projects the firm undertakes are in its core business, stand-alone risk is likely to be highly correlated with its corporate risk.
- In addition, corporate risk is likely to be highly correlated with its market risk.

11-25

What is sensitivity analysis?

- Sensitivity analysis measures the effect of changes in a variable on the project's NPV.
- To perform a sensitivity analysis, all variables are fixed at their expected values, except for the variable in question which is allowed to fluctuate.
- Resulting changes in NPV are noted.

11-26

What are the advantages and disadvantages of sensitivity analysis?

- Advantage
 - Identifies variables that may have the greatest potential impact on profitability and allows management to focus on these variables.
- Disadvantages
 - Does not reflect the effects of diversification.
 - Does not incorporate any information about the possible magnitudes of the forecast errors.

11-27

Is this project likely to be correlated with the firm's business? How would it contribute to the firm's overall risk?

We would expect a positive correlation with the firm's aggregate cash flows.

As long as correlation is not perfectly positive (i.e., $\rho \neq 1$), we would expect it to contribute to the lowering of the firm's total risk.

11-28

If the project had a high correlation with the economy, how would corporate and market risk be affected?


The project's corporate risk would not be directly affected. However, when combined with the project's high stand-alone risk, correlation with the economy would suggest that market risk (beta) is high.

11-29

If the firm uses a +/- 3% risk adjustment for the cost of capital, should the project be accepted?

- Reevaluating this project at a 13% cost of capital (due to high stand-alone risk), the NPV of the project is -\$2.2 .
- If, however, it were a low-risk project, we would use a 7% cost of capital and the project NPV is \$34.1.

11-30



What subjective risk factors should be considered before a decision is made?

- Numerical analysis sometimes fails to capture all sources of risk for a project.
- If the project has the potential for a lawsuit, it is more risky than previously thought.
- If assets can be redeployed or sold easily, the project may be less risky.


11-31



What is real option analysis?

- Real options exist when managers can influence the size and riskiness of a project's cash flows by taking different actions during the project's life.
- Real option analysis incorporates typical NPV budgeting analysis with an analysis for opportunities resulting from managers' decisions.

11-32



What are some examples of real options?

- Investment timing options
- Abandonment/shutdown options
- Growth/expansion options
- Flexibility options

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