Chapter 8

Using Discounted Cash Flow Analysis to Make Investment Decisions

Topics Covered

- Discounted Cash Flows (not Accounting Profits)
- Incremental Cash Flows
- Treatment of Inflation
- Separate Investment & Financing Decisions
- Calculating Cash Flows
- Example: *Blooper Industries*

Cash Flow vs. Accounting Income

- Discount actual cash flows
- Using accounting income, rather than cash flow, could lead to erroneous decisions.

Example

A project costs $2,000 and is expected to last 2 years, producing cash income of $1,500 and $500 respectively. The cost of the project can be depreciated at $1,000 per year. Given a 10% required return, compare the NPV using cash flow to the NPV using accounting income.

Cash Flow vs. Accounting Income

	Year 1	Year 2
Cash Income	$1500	$ 500
Depreciation	-$1000	-$1000
Accounting Income	+ 500	- 500

$$\text{Accounting NPV} = \frac{500}{1.10} + \frac{-500}{(1.10)^2} = \$41.32$$

Cash Flow vs. Accounting Income

	Today	Year 1	Year 2
Cash Income		$1500	$ 500
Project Cost	-2000		
Free Cash Flow	-2000	+1500	+ 500

$$\text{Cash NPV} = \frac{-2000}{1.10} + \frac{1500}{(1.10)^2} + \frac{500}{(1.10)^3} = -\$223.14$$

Incremental Cash Flows

- Discount Incremental Cash Flows
  - with-versus-without principle

Incremental Cash Flow	=	Cash flow with project	-	Cash flow without project

- Include All Indirect Effects
  - For example, new products often damage sales of an existing product
  - Sometimes a new project will help the firms existing business (e.g. airline company)

Incremental Cash Flows

- Forget Sunk Costs
  - Sunk costs remain the same whether or not you accept the project. Therefore, they do no affect project NPV
- Include Opportunity Costs (p.217 example)
  - Opportunity cost is the benefit or cash flow forgone in the future as a result of an action
  - The opportunity costs of resources are their market price if the market is efficient
- Recognize the Changes in Working Capital
  - For example, the changes in AR, AP, inventories actually mean cash inflows or outflows
- Beware of Allocated Overhead Costs
  - For example, the costs of rent, heat, or electricity incurred by accepting the project

Incremental Cash Flows

IMPORTANT

Ask yourself this question

Would the cash flow still exist if the project does not exist?

➲If yes, do not include it in your analysis.
➲If no, include it.

Inflation

INFLATION RULE

- Be consistent in how you handle inflation
  - Use nominal interest rates to discount nominal cash flows.
  - Use real interest rates to discount real cash flows. (although this is not commonly done)
- ★ Analysts sometimes forget to account for the effects of inflation when forecasting future cash flow, but discount those real cash flows at a nominal discount rate
- You will get the same results, whether you use nominal or real figures (latter example)

Inflation

Example

You are considering moving into a new office, which will cost you $8,000 for one year (you should pay it immediately), increasing at 3% a year (the forecasted inflation rate) for 3 additional years (4 years total). If discount rates are 10% what is the present value cost of the lease?

$$1 + \text{real interest rate} = \frac{1 + \text{nominal interest rate}}{1 + \text{inflation rate}}$$

Inflation

Example - nominal figures

Year	Cash Flow	PV @ 10%
0	8000	8000
1	$8000 \times 1.03 = 8240$	$\frac{8240}{1.10^1} = 7490.91$
2	$8000 \times 1.03^2 = 8487.20$	$\frac{8487.20}{1.10^2} = 7014.22$
3	$8000 \times 1.03^3 = 8741.82$	$\frac{8741.82}{1.10^3} = 6567.86$
		$29,072.98

Inflation

Example - real figures

Year	Cash Flow	PV@6.7961%
0	8000	8000
1	8000	$\frac{8000}{1.068^{1}} = 7490\ .91$
2	8000	$\frac{8000}{1.068^{2}} = 7014\ .22$
3	8000	$\frac{8000}{1.068^{3}} = 6567\ .86$
		$= \$\ 29072\ .98$

Separation of Investment & Financing Decisions

- When valuing a project, ignore how the project is financed.
  - If you decide to finance partly by debt, neither subtract the debt proceeds from the required investment nor recognized the interest and principal payments as cash outflows
  - We should view the project as if it were all equity-financed
  - The above procedures allow us to focus exclusively on the project cash flow, not the cash flows associated with alternative financing schemes

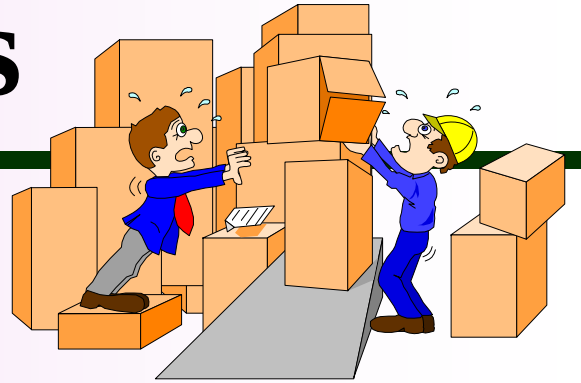
Separation of Investment & Financing Decisions

- If you still feel uncomfortable with the financing-independent assumption, ask yourself the following question: *Is the project existence dependent on the financing? If no, you must separate financing and investment decisions.*

Calculating Cash Flow

- A project cash flow is the sum of three components:
  - Investment in fixed assets
    - Cash outflow for plants and equipments
    - Cash inflow for selling these assets after the project
  - Investment in working capital
    - Investment in inventory → cash outflow
    - Investment in accounts receivable → cash outflow
  - Cash flow from operations
    - Equivalent methods 1 to 3 (p.222) and example 8.6 on p.223

Blooper Industries



	Year 0	1	2	3	4	5	6
Cap Invest	10,000						
WC	1,500	4,075	4,279	4,493	4,717	3,039	0
Change in WC	1,500	2,575	204	214	225	–1,678	–3,039
Revenues		15,000	15,750	16,538	17,364	18,233	
Expenses		10,000	10,500	11,025	11,576	12,155	
Depreciation		2,000	2,000	2,000	2,000	2,000	
Pretax Profit		3,000	3,250	3,513	3,788	4,078	
.Tax (35%)		1,050	1,137	1,230	1,326	1,427	
Profit		1,950	2,113	2,283	2,462	2,651	

(,000s)

Blooper Industries

Cash Flow From Operations (,000s)

Revenues	15,000
- Expenses	10,000
– Depreciation	2,000
= Profit before tax	3,000
-Tax @ 35 %	1,050
= Net profit	1,950
+ Depreciation	2,000
= CF from operations	3,950

or $3,950,000

Blooper Industries

Net Cash Flows (entire project) (,000s)

	Year 0	1	2	3	4	5	6
Cap Invest	-10,000						
Salvage value							1,300
Change in WC	-1,500	- 2,575	- 204	- 214	- 225	1,678	3,039
CF from Op		3,950	4,113	4,283	4,462	4,651	
Net Cash Flow	-11,500	1,375	3,909	4,069	4,237	6,329	4,339

NPV @ 12% = $4,222,350

Blooper Industries

- Forecasting working capital
  - Customers on average pay with a 2-month lag (p.227)
- A further note on depreciation
  - The nominal amount of depreciation is fixed, and therefore the higher the rate of inflation, the lower the real value of the depreciation
  - Modified accelerated cost recovery system (MACRS) (p.228 table 8-2, p.229 table 8-3)
- More on salvage value
  - When selling equipment, taxes are needed on the difference between the sales price and the book value of the asset