MODULE 4

HOW DO FIRMS VALUE PROJECTS AND MAKE DECISIONS?

BOONE BOWLES

Agenda

1. What is our go-to decision rule?
2. Can we work on some examples?
3. Are there other decision rules?
4. What if I face resource constraints?
5. How do we forecast and calculate future cash flows?
6. How do we analyze our projections and decision?
7. A final thought.



A Typical Problem

The business you started in your garage last year has found some success! You've made some money and like managing the business, but you've got a competitor that wants to buy you out for the price of $1,000,000.

You've also always kind of wanted to go to graduate school, get an MBA, and find a desk job somewhere in Texas. Graduate school costs $50,000 per year for two years.

Should you keep running the business or sell out and go get an MBA?

More Details

You project that your business will generate cash flow of $100,000, $150,000, and $250,000 over the next three years, before growth levels off at 5%. You consider the appropriate discount rate to be 15%.

You project that after graduate school you will obtain a salary of $90,000. You expect it to grow at 2% per year. You consider the appropriate discount rate for your salary to be 5%.

You have always planned to retire in 25 years.

Should you keep running the business or sell out and go get an MBA?

The NPV rule is our go-to decision rule!

Decision Rule

- **When choosing among alternatives, take the one with the highest NPV.**
- **When evaluating a single project, accept if NPV > 0.**

Interpretation

- **NPV>0→ creates value for shareholders.**
- **NPV=0→ break-even (investor is indifferent).**
- **NPV<0→ destroys value; reject.**

What to do with my web hosting business?

Suppose you started a Web site hosting business and then decided to return to school. Now that you are back in school, you are considering selling the business within the next year. An investor has offered to buy the business for $200,000 whenever you are ready. If the interest rate is 10%, which of the following three alternatives is the best choice?

1. Sell the business now.
2. Scale back the business and continue running it while you are in school for one more year, and then sell the business (requiring you to spend $30,000 on expenses now, but generating $50,000 in profit at the end of the year).
3. Hire someone to manage the business while you are in school for one more year, and then sell the business (requiring you to spend $50,000 on expenses now, but generating $100,000 in profit at the end of the year).

Timing Preference

Regardless of our preferences for cash today versus cash in the future, we should always maximize NPV first. We can then borrow or lend to shift cash flows through time and find our most preferred pattern of cash flows.

The Separation Principle

Security transactions in a normal market neither create nor destroy value on their own. Therefore, we can evaluate the NPV of an investment decision separately from the decision the firm makes regarding how to finance the investment or any other security transactions the firm is considering.

Project Maroon

You are considering the launch of a new product. The upfront development cost is $25 million, and you expect to earn cash flow of $6.5 million for the next six years. If the appropriate discount rate is 15%, do you take on Project Maroon?

Project Graphite

You are considering the launch of a new product. In addition to the upfront development cost of $20 million, the project will require expenses of $2.5 million at the end of both two years and four years from now. You expect to earn cash flow of $6.5 million for the next six years. If the appropriate discount rate is 15%, do you take on Project Graphite?

Which projects should we take?

Your division at Maroon Inc., a larger networking company, has put together a project proposal to develop a new home networking router. The excepted NPV of the project is $17.7 million, and the project will require 50 software engineers. Maroon Inc. has a total of 190 engineers available, and the router project must compete with other projects for these engineers. How should Maroon Inc prioritize the following projects?

Project	NPV ($ millions)	Engineering Headcount (EHC)	Profitability Index	Cumulative EHC Required
Project A	22.7	47	0.483	
Project B	8.1	44	0.184	
Project C	14.0	40	0.350	
Project D	11.5	61	0.189	
Project E	20.6	58	0.355	
Project F	12.9	32	0.403	
Router	17.7	50	0.354	

Three Step Process to FCF

1. Project earnings to get Net Operating Profit After Tax (NOPAT)
   - $EBIT \times (1 - t_c)$
   - Pay attention to non-cash expenses like depreciation.
2. Project Capital Expenditures (CAPEX)
   - Buying new equipment and selling at end of project.
   - Opportunity costs of fixed assets.
3. Project Net Working Capital requirements (NWC)
   - Increases in cash or inventory to start project.
   - NWC requirements throughout.
   - Recovering at end of project.

Cisco's New Home Networking Appliance: HomeNet

- Cisco spent $300,000 to research the feasibility of the new product.
- Sales forecast is for 100,000 units per year.
- Expected four-year life of product.
- Retail price $375. Wholesale $260.
- Total engineering and design costs of $5 million.
- Production and packaging costs of $110 per unit.
- Software development will take 50 engineers a full year. Cost per engineer is $200,000 per year.
- New equipment installation with upfront cost of $7.5 million.
- Product will be ready and for sale in one year.
- Expected marketing and support costs of $2.8 million per year.

- New equipment will be installed at the end of the first year, depreciated using SL depreciation for five years, and assume zero salvage value.
- New equipment will be installed with up front cost of $7.5 million.
- No increase in NWC.
- Discount rate 12%.

Table A-1. **3-, 5-, 7-, 10-, 15-, and 20-Year Property Half-Year Convention**

Year	Depreciation rate for recovery period					
	3-year	5-year	7-year	10-year	15-year	20-year
1	33.33%	20.00%	14.29%	10.00%	5.00%	3.750%
2	44.45	32.00	24.49	18.00	9.50	7.219
3	14.81	19.20	17.49	14.40	8.55	6.677
4	7.41	11.52	12.49	11.52	7.70	6.177
5		11.52	8.93	9.22	6.93	5.713
6		5.76	8.92	7.37	6.23	5.285
7			8.93	6.55	5.90	4.888
8			4.46	6.55	5.90	4.522
9				6.56	5.91	4.462
10				6.55	5.90	4.461
11				3.28	5.91	4.462
12					5.90	4.461
13					5.91	4.462
14					5.90	4.461
15					5.91	4.462
16					2.95	4.461
17						4.462
18						4.461
19						4.462
20						4.461
21						2.231

Should we take on this project?

- New product will sell for $120 for first three years, then $110 for next five years.
- Sales forecast is for 3,000 units, then 5,000; 6,000; 6,500; 6,000; 5,000; 4,000; 3,000.
- Variable cost per unit is $60.
- Fixed costs per year are $25,000.
- New Equipment costs $800,000.
- MACRS classification as 7 year equipment.
- Salvage value is 20% of purchase price at end of year 8.
- Income tax rate at 34%.
- NWC will need beginning infusion of $20,000.
- NWC will need to be 15% of revenue.
- Discount rate is 15%.

Timing: NWC is 15% of annual sales at year-ends 1–7; full remaining balance released in Year 8.

What did we learn here?

1. What is our go-to decision rule?
   - NPV
2. Can we work on some examples?
   - Yes, and we did.
3. Are there other decision rules?
   - Yes, but NPV is the best.
4. What if I face resource constraints?
   - Screen with PI; maximize feasible total NPV.
5. How do we forecast and calculate future cash flows?
   - We do it carefully.
6. How do we analyze our projections and decision?
   - BE, Sensitivity, and Scenario Analysis.
7. A final thought.
   - Discount rates will complete the story.





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