CAPITAL BUDGETING
Outline

1. DECISION MAKING CRITERIA (Present Value again)
2. PROJECT CASH FLOWS
3. VALUATION: NEW OR EXISTING PROJECT / BUSINESS
4. MORE ON INCREMENTAL CASH FLOWS
5. THE 4 CENTRAL INPUTS TO CASH FLOW FORECASTS
6. SENSITIVITY ANALYSIS
   Varying the Key Parameters: Some Sensitivity Analysis
7. Some conclusions / generalizations

1. Decision Making Criteria: Valuation of Investment

- Many methods used in investment appraisal but, in general, these methods may be categorized into 2 areas:
  - Non-discounted cash flow methods (NCF)
    - Payback
    - Average return on book value (not to be covered)
  - Discounted cash flow methods (DCF)
    - NPV
    - IRR

DCF methods properly focus on opportunity cost of money for firm!
Concentrate on cash flows rather than on accounting profits

Net present value rule

$$NPV = -C_0 + \sum_{t=1}^{T} C_t \left[\frac{1}{(1+r)^t}\right]$$

Initial investment | Present value of cash flows

- Where r is the firm's cost of capital or opportunity cost
- Decision rule:
  - Accept projects with NPV>0
  - Reject projects with NPV<0

Capital Budgeting - 3

Internal rate of return rule

- IRR is return that equates initial investment with PV of cash flows

$$0 = -C_0 + \sum_{t=1}^{T} C_t \left[\frac{1}{(1+IRR)^t}\right]$$

Decision rule:

- Accept projects with IRR>r
- Reject projects with IRR<r

Problems with IRR: 1. Ignores Value Creation (Scale).

2. Assumes cash flows are reinvested at IRR.

3. Can have Multiple IRRs if later cash flows are negative.

Capital Budgeting - 4

NPV Profile

- Graph of NPV against discount rate. Allows graphical presentation of how value depends on discount rates.
- Useful when you are not sure about the discount rate.

BEYOND THE BASICS

- The key to capital budgeting is not just the mechanics (NPV and IRR are just mechanical!) - but rather varying key parameters into cash flow forecasts- ALONG with different discount rates changes the PRESENT VALUE of the cash flows.
- It is in how the assumptions are modeled that many mistakes can be made. This note thus does not focus on discount rates, but rather on the formulation of the cash flows.
- Capital budgeting emphasizes the key role management has in value creation by taking projects and expanding the size of the firm if profitable.

2. PROJECT CASH FLOWS

Goal is to Identify & Value Cash Flows

Once we have the cash flows we can value the project or company!

A. Relevant Cash Flows: WHAT ARE THESE?

- Relevant cash flows are those that come into or out of being because a project is undertaken, thus we are interested in incremental cash flows.
- Incremental cash flows - Any and all changes in the firm's future cash flows that are a direct consequence of taking the project.

B. The Stand-Alone Principle

Viewing projects as "mini-firms" with

- their own assets,
- revenues and
- costs

Allows us to evaluate the investments separate from the other activities of the firm.

Capital Budgeting - 7

C. ESTIMATING CASH FLOWS

PRO FORMA FINANCIAL STATEMENTS AND PROJECT CASH FLOWS

Getting Started: Pro Forma Financial Statements

Treat the project as a mini-firm:

(This section initially ASSUMES that you know you have a good project/ business!)

1. PROFORMAS: Start with pro forma (forecasted) income statement and balance sheet (don't include interest for valuation, include to estimate funds needed).

- The proforma income statement forecasts sales, costs and thus profit for the life of the project.
- The proforma balance sheet answers 2 primary questions:

1. The amount of assets needed to generate forecasted sales.

Question: How do we get sales forecasts?

2. The amount of external capital needed to finance the assets

Capital Budgeting - 8

3. VALUATION
NEW OR EXISTING BUSINESSES

Goal is to Identify & Value Cash Flows

From the pro forma statements, compute:

3 COMPONENTS TO INCREMENTAL CASH FLOWS

- **A.** Cash flows from assets (Change for additions)
- **B.** INVESTMENTS
- **C.** NET TERMINAL VALUE

Note: The above can be used to value an entire firm as well as an incremental project.

A. CASH FLOWS FROM ASSETS

For any period estimate:

(1) sales, (based on growth/ market share)

(2) costs and thus the profit margin (as a % of sales typically)

(3) capital spending (i.e. factory expansion) and also

(4) net working capital requirements:

Cash flow from assets =

+ operating cash flow

- incremental capital spending / economic depreciation

- change in net working capital

where operating cash flow =

+ earnings before interest and taxes (EBIT)

- taxes

+ depreciation

Cash Flows and A Simple Income Statement:

SALES
- Cost of Goods Sold (CGS)
- Selling, General and Admin. Expense
- Depreciation

= EBIT
- Taxes
+ Depreciation

= Operating Cash Flow

A Proforma income statement is merely the forecast of the income statement (not adding back depreciation, subtracting interest) into the future for the relevant number of years.

B. ESTIMATING INVESTMENT COST:

1. Cost of acquiring Investment / Installing It.
2. Additions to Net Working Capital:
   - + Cash
   - + AR
   - + Inventory
   - - A/P
   - - TAXES PAYABLE
3. NET PROCEEDS from SALE of Existing Assets.
4. TAX EFFECTS associated with Sales and Purchases.
   - ➢ Tax write-offs
   - ➢ Capital gains
   - ➢ tax on depreciation recapture
   - ➢ Investment Tax Credit

C. ESTIMATING TERMINAL VALUE

2 alternatives:

1. Salvage or shut down business
2. Sell business as a going concern to a new owner

1. SALVAGE VALUE / SHUT DOWN

I. SALE AMOUNT FROM ASSETS

ii. RECAPTURE WORKING CAPITAL

iii. TAX EFFECTS - GAIN VS BOOK VALUE

2. SALE OF BUSINESS AS GOING CONCERN

i. PV OF FUTURE BUSINESS (Perhaps a multiple of earnings at that date OR use an Annuity Formula using last periods cash flow.)

Decision-making criteria

- Now that you have your sash flows, you can VALUE your project/firm (NPV/IRR)
- Remember TO QUESTION Cash Flows. Currently we have not made any *managerial decisions - purely mechanical so far.*
- *Important distinction between estimating funds needed and decision making/valuation:*
  - To value project: Ignore financing costs (interest / dividends).
  - The project cash flows do not depend of where you get the money (the financing decision) - financing costs will be reflected in the discount rate in NPV calculation.

An Example: Fairways Driving Range

Two friends are considering opening a driving range for golfers. Because of the growing popularity of golf, they estimate such a range could generate:

- rentals of 20,000 buckets at $3 a bucket the first year, and
- rentals will grow at 750 buckets a year thereafter.

Equipment requirements include:

- ball dispensing machine $2,000, ball pick-up vehicle $8,000, tractor $8,000
- All the equipment is 5-year ACRS property, and is expected to have a salvage value of 10% of cost after 6 years.
- Stocking a small shop selling tees, visors, gloves, towels, sun-block, etc., plus a checking account for the business make:

  Net working capital $3,000 to start, growth of 5% per year.
- Annual fixed operating costs are expected as follows:
- Expenditures for balls and baskets, initially $3,000, are expected to grow at 5% per year. Fixed Costs: Lease on the land + Upkeep = $53,000 per year.
- The relevant tax rate is 20% and the required return is also 15%.

Project is to be evaluated over a 6 year life: **Should they proceed?**

Capital Budgeting - 15

Projected revenues

Year	Number of buckets	Revenues @$3.00 per bucket	Costs of balls and buckets
1			
2			
3			
4			
5			
6			

Capital Budgeting - 16

Depreciation on $18,000 of equipment

Year	ACRS %	Depreciation	Book Value
1	20.00%	$3,600	$14,400
2	32.00%	5,760	8,640
3	19.20%	3,456	5,184
4	11.52%	2,074	3,110
5	11.52%	2,074	1,036
6	5.76%	1,036	0

Capital Budgeting - 17

Pro forma income statement

Year	1	2	3	4	5	6
Revenues						
- Variable costs						
- Fixed costs						
- Depreciation						
= EBIT						
- Taxes						
= Net income						

Capital Budgeting - 18

Projected increases in net working capital

Year	Net WC	Increase in WC
0		
1		
2		
3		
4		
5		
6		

Capital Budgeting - 19

Projected cash flows

Year	EBIT	- Taxes	+ Depr.	= Operating CF
1				
2				
3				
4				
5				
6				

Capital Budgeting - 20

Total cash flow

Year	+ Operating CF	- Increase in WC	- Capital spending	= Total CF
0				
1				
2				
3				
4				
5				
6				

And the final NPV = ? ; The IRR = ?;

4. ADVANCED CASH FLOWS: INCREMENTAL IS KEY

- KEY QUESTION:
  What' the result if the firm doesn't take the project?
- Specific Items to Consider:

A. Sunk Costs

- Sunk cost - A cash flow already paid or already promised to be paid.
  Obviously, these costs should not be included in the incremental flows of a project.
  example: Allocated Overhead:

- Conclusion: Ignore sunk costs unless adding new overhead in proportion to expenditure.

B. Transfer Pricing: need market prices.

C. Opportunity Costs

- Opportunity cost - Any cash flows lost or foregone by taking one course rather than another.
- These apply to any asset or resource that has value if sold rather than used.

D. Side Effects: CANNIBALIZATION / SALES CREATION

- With multi-line firms, projects often affect one another - sometimes helping, sometimes hurting.
- Erosion - Revenues gained by a new project at the expense of the firm's other existing products or services.
  - Example: Every time Kellogg's brings out a new oat cereal it probably causes some erosion of existing product sales.
  - Qualification: If another firm would (or could) produce this product any sales erosion should be ignored - "water over the dam."

Capital Budgeting - 23

E. Net Working Capital

- New projects often require incremental investments in cash, inventories, and receivables that need to be included in cash flows (if they are not offset by changes in payables, such as taxes or accounts payable.)
- Later, as projects end, this investment is often recovered.

F. Financing Costs

- Do not include any interest or principal on debt or any dividends or other financing costs in computing cash flows.
  - The discount rate will take care of that.
  - Financing costs represent the division of cash flows to providers of capital as a result of the financing decision.
- This is the **BIGGEST DIFFERENCE** between financial forecasting and project/firm valuation.

G. After-Tax vs. Before-Tax Cash Flows

  - Use after-tax cash flow - not accounting earnings.

Capital Budgeting - 24

5. The 4 Central Inputs to Cash Flow Forecasts

1. Initial Sales, S.

2. Rate of Growth in Sales, g (KEY: Consult with marketing gurus.

3. The After-Tax Profit Margin, p = $\frac{EBIAT}{SALES}$

4. Asset Utilization, a = $\frac{FA + NWC}{SALES}$

5. Capacity Utilization and Fixed vs. Variable Cost important.

- Using these four inputs we can express the Cash Flows from Assets as: $CF = [\frac{EBIAT}{SALES} - (\frac{FA + NWC}{SALES} * \frac{g}{1+g})] * SALES$

•Where CF = (Free) Cash Flow from Assets

•EBIAT = Earnings before interest, after tax

•FA = Fixed Assets

•NWC = Net Working Capital

•g = growth rate in sales.

Dividing both sides by SALES we get:

$$\frac{CF}{SALES} = [\frac{EBIAT}{SALES} - (\frac{FA + NWC}{SALES} * \frac{g}{1+g})]$$

- This formula highlights the following economic points (some obvious):

1. Cash Flows increase with profit margins: $p = \frac{EBIAT}{SALES}$
2. Cash Flows decrease with capital intensity of assets: $a = \frac{FA + NWC}{SALES}$
3. Cash flows decrease with growth: g.

6. Varying the key parameters: Sensitivity Analysis

These effects and the sensitivity analysis should highlight several questions that one may want to ask about valuations:

1. How sensitive is value to changes in:
   - discount rate
   - growth rate of sales
   - capital intensity ratio
   - profitability ratios
2. Given a current valuation level, what levels of the key variables must exist to warrant the valuation, given a certain discount rate -
   - Will the company be able to sustain its profit margins?
   - Do the growth rates make sense, given the growth rate of the economy, the industry and the company's market share
   - Are the capital intensity ratios sensible, given the company's strategy and comparable ratios in the industry?

7. Some conclusions / generalizations

- It is not appropriate to value earnings, per se.
  - You must take into account fixed assets and working capital required to support the sales and generate the earnings.
- Discounted cash flow analysis is not short term.
  - The Value depends on the discount rate used to value the future cash flows. It properly takes into account long term cash flows.
- Consider economic questions which emphasize change in assessing a company's performance.

  Ask questions such as:
  - Operating strategies: Has the company lowered price to gain a future payoff (Airlines?)
  - Are there future scale economies as a large portion of cost is fixed?