FIN-511
Chapter 11

- Major Topics:
- Capital Budgeting
  - Payback, NPV, PI, IRR, MIRR
  - Scenario Analysis
  - Solver

Capital Budgeting

- Process of determining how a firm should allocate its capital resources to available long-term investment opportunities
- If benefits exceed the costs, accept the project
- Cash Flows must be: Incremental & After-tax
- Disregard: Sunk Costs & Financing Costs

Relevant Cash Flows

- **Initial Outlay** at t = 0
- Includes: equipment cost, shipping, installation, training, old equipment salvage value, taxes on salvage, change in NWC
- **Annual After-tax Cash Flows**
- Includes: additional revenues, cost savings, additional expenses, change in depreciation

  CFAT = CFBT (1 - T) + Δ DEP (T)
- **Terminal Cash Flow**: occurs in the final time period of the project
- Includes: Salvage, taxes, shut-down expenses, recovery of NWC

Depreciation

- Excel functions for depreciation include:
- SLN - straight line
- DDB - double-declining balance
- DB - fixed-declining balance
- SYD - Sum of the years' digits
- VDB - Variable declining balance

Straight-Line Depreciation

SLN(cost,salvage,life)

Cost: is the initial cost of the asset.

Salvage: is the value at the end of the depreciation

Life: is the number of periods over which the asset is being depreciated

Suppose you've bought a truck for $30,000 that has a useful life of 10 years and a salvage value of $7,500. The depreciation allowance for each year:

SLN(30000, 7500, 10) equals $2,250

Decision Methods

- Payback Method:
- How long will it take to recover the initial investment?
- Payback Period = Initial Outlay / Annual Payment (assuming an annuity)
- Discounted Payback:
- Looks at the payback period based upon discounting the annual cash flows
- Fame_Payback(cashflows)

Net Present Value

- NPV = Discounted value of the expected annual cash flows - initial investment
- NPV Function:

  NPV(rate,value1,value2, ...)

  Rate: is the discount rate

  Value1, value2, ... are 1 to 29 arguments representing the payments and income.
- Remember true NPV is NPV - initial investment
- Decision rule?

Profitability Index

- Scaled present value
- PI = PVCF / IO

  PVCF = present value of cash inflows

  IO = initial outflow

  Or PI = (NPV + IO) / IO
- Decision rule?

Internal Rate of Return

- Measure of the average annual rate of return on the project
- What rate equates the cash inflows to the cash outflows
- $IO = \sum CFAT_t / (1 + IRR)^t$ and solve for IRR
- Decision rule?
- Excel function:
- IRR(values,guess)

IRR Problems

- IRR & NPV may give different answers when considering Mutually Exclusive projects
- If the projects are of greatly different sizes, if the timing or size of the cash flows are different, or if there is more than one change in sign of annual cash flows
- Due to the reinvestment rate assumption. What rate does NPV and IRR assume the annual CF's are reinvested?

Modified Internal Rate of Return

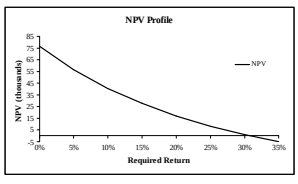
- MIRR is solved in the same way, but relates the initial investment with the future value of the annual cash flows, compounded at the required rate of return.
- Then find the rate that equates the two values.
- Excel function:
- MIRR(values,finance_rate,reinvest_rate)

  Finance_rate: is the interest rate you pay on the money used in the cash flows.

  Reinvest_rate: is the interest rate you receive on the cash flows as you reinvest them.

NPV Profile Charts

- Chart of NPV at various discount rates
- Can determine how sensitive NPV is to the assumed discount rate.
- Can also use to compare two mutually exclusive projects at various discount rates.



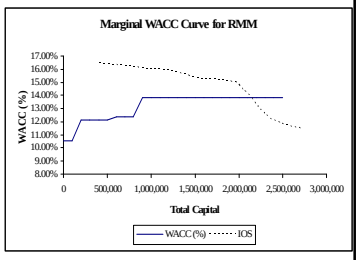
Scenario Analysis

- Scenario Manager allows you to analyze the effects of different input assumptions.
- For example, call up Tools, Scenario, and specify the best case, worst case, and expected case.
- Specify the formulas to use in the scenario.
- Finally, request a summary to calculate the values.

Scenario Summary	Current Values:	Best Case	Expected Case	Worst Case
Changing Cells:				
Maintenance	5,000	2,000	5,000	8,000
Defects	2,000	1,000	2,000	5,000
Result Cells:				
Payback Period	2.58	2.33	2.58	3.09
Discounted Payback	3.53	3.08	3.53	4.25
Net Present Value (NPV)	27,552.24	36,401.93	27,552.24	14,277.70
Profitability Index (PI)	1.44	1.58	1.44	1.23
Internal Rate of Return (IRR)	30.95%	35.85%	30.95%	23.41%
MIRR	23.69%	26.03%	23.69%	19.82%

Optimal Capital Budget

- Calculate the IRR's of all projects and rank from best to worst.
- Plot the IRR's on the marginal WACC curve, from best to worst, using the cost of each project as the capital cost. This is the IOS.
- Invest in all projects that have an IRR higher than the WACC.



Capital Rationing

- Under capital rationing, there is some constraint beyond funding all positive NPV projects. Perhaps limited capital, manpower, manufacturing facilities.
- With a small number of projects you can simply rank the projects and eliminate the worst based on the limiting criteria.
- With a larger number of projects you must use the computer to sort through the options

Solver

- You can use Solver to choose the best projects.
- Choose Tools, Solver, specify the Target Cell, whether to Max or Min, and then specify the constraints.
- For the textbook example: This uses linear programming to maximize NPV, while, constraining cost to a maximum value and including each project 1 or 0 times.

- Assignment:
  - Do all of the work in the chapter, final result should look like Exhibits 11-1-6 & 10 and all graphs on these exhibits. Include completed spreadsheets with all financial functions (PB, DPB, NPV, PI, IRR, MIRR).
  - Format exactly like in the text.
  - Remember Columns/Rows/Gridlines
  - Each person will turn in one set of information: print out of spreadsheet and print out of cell formulas
  - Work is individual.
  - Due at the beginning of class