Finance Midterm Notes

Finance 2 (Wilfrid Laurier University)

BU393 Notes
Chapter 9
Capital Budgeting

What Does Capital Budgeting Mean?

- **Capital Budgeting** – a method for evaluating long-term investment opportunities in which all cash flows are discounted to the present
    - Process of deciding which long-term investments or projects a firm will acquire
- Firms must allocate limited funds in such a way as to provide the most long-term profits

Steps in the Capital Budgeting Process

- **Identification of opportunities**
    - Firm must have some method in place by which new opportunities are identified and brought to management's attention
    - Employees on the front line must have both the incentive and the means to communicate ideas to those who have the authority to implement them
- **Evaluation of opportunities**
    - Requires all costs and benefits to be tabulated
    - Data subjected to analysis
- **Selection**
    - Firms have more good projects than they can accept in any given year
        - Due to limited funds or human/physical capital restraints
- **Implementation**
    - Machines will be purchased, people hired, or investments made
    - Management must ensure that costs reflect what was initially proposed and evaluated
- **Post audit**
    - Management must compare the costs and revenues with the original projections
    - Holding employees responsible for errors in their projections gives them an inventive to make more accurate future cost and revenue projections
    - Employees who know they must later explain deviations from projections will study the results of their last estimates to improve their future performance

Techniques for Analysing Projects

Method	Description	Equation	Decision Criteria
Payback Period (PB)	Number of years required to recapture initial investment	$= \frac{Initial\ investment}{Annual\ cash\ flow}$	None
Net Present Value (NPV)	The present value (PV) of all cash flows	$= PV\ (cash\ inflows) - PV\ (cash\ outflows)$	Accept if greater than or equal to zero
Profitability Index (PI)	The ratio of the present value of the cash inflows to outflows	$= \frac{PV\ (inflows)}{PV\ (outflows)}$	Accept if greater than or equal to 1

(continued)

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Method	Description	Equation	Decision Criteria
Internal Rate of Return (IRR)	The interest rate that sets the present value of the cash inflows equal to the present value of the outflows	Calculator or spreadsheet	Accept if greater than or equal to cost of capital
Modified Internal Rate of Return (MIRR)	The interest rate that sets the present values of the outflows equal to the future values of the inflows, computed at the firm's cost of capital	Calculator or spreadsheet	Accept if greater than or equal to cost of capital

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- **Payback Period** – the number of years it takes to recover initial investment
    - Mechanically the easiest to compute but theoretically the worst evaluation method
    - Timing + riskiness of cash flows ignored
    - Used to supplement more sophisticated techniques
    - **Computation**
        - Easy if annual cash flows are annuities
        - **Payback = Initial Investment/Annual cash flow**
        - If cash flows are not equal, create accumulation table
    - **Advantages**
        - Simplicity
        - Provides information about how long funds will be tied up in a project
        - Shorter the payback period, the greater the project's liquidity
    - **Disadvantages**
        - No clearly identified accept/reject criteria
        - No risk adjustment
        - Ignores cash flows beyond the payback period
        - Ignores the time value of money
    - **Discounted Payback Method** – the amount of time it takes for a project to recoup the investment and the cost of capital
        - Computes the PV of each cash flow then finds the payback based on those discounted values

        - Takes into account time value of money but suffers same disadvantages as payback period method
- **Net Present Value** – the sum or net of all cash flows from a project. It is often described as the net of all the present value of the cash inflows minus the present value of the cash outflows
    - Most popular and theoretically sound evaluation tool available to analysts
    - **Theory**
        - After conversion into present values, the cash inflows are compared with the cash outflows
        - If inflows exceed outflows, the project is acceptable
        - The difference between the cash outflows and the cash inflows is the NPV
    - **Computation**
        - **NPV = PV(cash inflows) – PV(cash outflows)**
        - $NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+i)^t} - Initial\ investment$
        - Discount rate is equal to the firm's cost of capital when evaluating projects similar in risk to others in the firm's portfolio
    - **Interpretation**
        - Positive NPV = the current value of the income exceeds the current value of the expenditure → project should be accepted
        - Negative NPV = project costs more than it will bring in → reject
        - NPV represents the increase (decrease) in value of the firm
    - **Net Present Value of Multi-Period Investments**
        - Need to compute NPV of all the periods and then subtract the present value of the outflows from the present value of the inflows to determine whether to invest in the opportunity
    - **Advantages**
        - Uses time value of money concept
        - Clear decision criterion
        - Discount rate adjusts for risk
            - By increasing or decreasing the discount rate, the firm can adjust for the riskiness of the cash flow
    - **Disadvantages**
        - May be difficult for someone without a background in financial theory to understand
    - **NPV Profile –** a graph of the NPV of a project at a variety of different discount rates. It shows the sensitivity of the project to the firm's cost of capital
        - Very difficult to accurately and confidently estimate the cost of capital for a firm
        - Before accepting/rejecting, we should determine whether a small error in our cost of capital estimate is important
            - Done by preparing NPV profile
        - Select number of different discount rates and compute NPV for each
            - Use any discount rates you choose → use larger and larger rates till NPV is negative

        - If you are confident that the cost of capital is less than the crossover point, accept the project
- **Profitability Index (Cost-Benefit Ratio)** – the ratio of the PV of cash inflows to the PV of the cash outflows. It provides a measure of the bang for the buck provided by investing in the project
    - $PI = \frac{PV\left(cash\,inflows\right)}{Initial\,investment}$
    - When the NPV is 0, PV of cash inflows will equal the PV (cash outflows) and PI will be 1
    - Accept project if PI > 1
    - Will always give the same accept/reject decision as NPV
    - **Computation**
        - Find present value of the cash inflows and divide by the present value of the cash outflows
    - **Advantages**
        - Useful as an aid in ranking projects from best to worst
        - May be necessary to rank projects if the firm does not have sufficient funds or capacity to accept all positive-NPV projects
        - 2 projects, one large, one small
            - NPV of large project may be greater even though smaller project has greater return on the dollars invested
            - PI highlights this difference by computing the return per dollar invested on a present value basis
            - Firm may be better off taking several small high-PI projects instead of one large positive-NPV project
    - **Disadvantages**
        - Leads to incorrect project rankings when capital is rationed
        - Under capital rationing, projects should be selected by NPV maximization
- **Internal Rate of Return** – the discount rate that sets the present value of the cash inflows to the present value of the cash outflows. It is the discount rate that sets NPV to 0
    - If IRR > cost of capital, the project is accepted
    - If IRR < cost of capital, the project is rejected
    - IRR more difficult to calculate than NPV but easier to interpret
    - **Theory**
        - Rather than inputting a discount rate and computing for NPV, we ask what the discount rate should be to make the NPV exactly equal to 0
        - If IRR calculated is acceptable return, project should be accepted
        - Accept the project if the IRR is greater than or equal to the cost of capital
    - **Computation**
        - More complicated when there are multiple cash flows
    - **Advantages**
        - Easy to interpret and explain
        - Will always provide the same accept/reject decision as NPV
    - **Disadvantages**

        - Reinvestment rate assumptions – most serious when using IRR to rank projects
            - Because the IRR method does not evaluate the project at a particular discount rate, it cannot be used for ranking mutually exclusive projects
        - Non-traditional cash flows = multiple IRRs
        - IRR ignores difference in scale
            - IRR does not give any help because it converts all cash flows to percentages and ignores the differences in size or scale of projects considered
    - **NPV vs. IRR**
        - Depends on who your audience is and whether you're ranking projects or simply determining which are acceptable and whether the project has alternating signs on the cash flows
        - Choice of analysis methodology also depends on whether you are selecting among many good projects or simply determining the acceptability of a single project
- **Modified Internal Rate of Return (MIRR)** – the discount rate that sets the terminal value of the cash inflows equal to the present value of the cash outflows, where the PV and terminal values are computed using the firm's cost of capital
    - **Terminal Value** – future value of the cash inflows
    - Cash outflows discounted back to the present at the cost of capital, and cash inflows are compounded at the cost of capital to the project's end
    - MIRR is the interest rate that grows the present value equal to the future value
    - Steps:
        - Find PV of all cash outflows at firm's cost of capital
        - Find FV of all cash inflows at firm's cost of capital (compounded to the point at which the last cash inflow is received)
        - Compute the rate that compounds the present value of the outflows so that they equal the future value of the inflows

BU393 Notes
Chapter 10
Capital Budgeting: Estimating Cash Flows

The Incremental Approach

- Compare NPV of the incremental cash flows
- If incremental cash flows have a positive NPV, we know the value of the company is greater if it adopts the project
    - Change in company's value equal to NPV of the incremental cash flow

Depreciation and Taxes

- **CCA Depreciation**
    - CCA = Capital Cost Allowance
    - Based on declining balance depreciation
    - Assigns assets to "property classes"

- Each property class has a different depreciation rate
- Examples:

Table 10.1 CCA Asset Classes

Asset Class	Type of Asset	Depreciation Rate
1	Buildings	4%
8	Furniture, Appliances, and Tools	20%
10	Vehicles	30%
38	Power-operated, moveable equipment (i.e., excavators, loaders, graders, etc.)	30%
43	Machinery & Equipment	30%
52	Computer Hardware	100%

- $Depr_t = dr \times UCC_{t-1}$
  - Dr = depreciation rate
  - UCC(t-1) = undepreciated capital cost at the end of the previous year (year t-1)
- The capital cost of an asset is the original cost of the asset plus any other costs associated with installing the asset (which we denote C0)
- The undepreciated capital cost is the portion of the capital cost that has not been depreciated
  - Book value of the asset
  - Capital cost less the **accumulated depreciation**
- **Accumulated Depreciation** – the sum of all depreciation expenses claimed for an asset
- **The Half-Year Rule**
  - If an asset is purchased partway through a year, then it should only be depreciated for the remaining fraction of the year
  - CCA system assumes that all assets are purchased in the middle of the year
    - First year of an assets life, company may only claim a half-year of depreciation

- **Depreciation Tax Shield**
  - Depreciation creates tax shield the same way as interest
  - Depreciation expense = tax deductible → reduces tax by an amount equal to the product of the expense and the corporate tax rate
- **Tax Impact of Salvage (Disposition)**
  - **Salvage Value** – the resale value of an asset at the end of a project, also called scrap value
    - Positive cash flow
  - Proceeds from selling an asset are not taxable
    - Corporate tax systems only taxes income from the ongoing business of the company
  - If an asset is sold for more than its purchase price (which is rare), then the difference is a taxable capital gain
  - When as asset is sold, the salvage value is simply deducted from the UCC of the pool
  - If salvage value of asset is less than its own UCC, then a residual amount is left in the pool and that residual generates a perpetual series of tax shields

- $PV\ Tax\ Shields_n = \frac{T \times dr \times (UCC_n - S)}{k + dr}$
  - Year n = terminal of the project (when the asset is sold)
  - UCC = the UCC of the disposed asset at the end of the terminal year
  - k = the weighted average cost of capital
  - dr = the CCA depreciation rate
- When PV tax shields is negative (UCC < salvage value), reduces the tax shields that other assets would have generated → PV of tax shieds that are lost due to the sale of the asset
- **Net Salvage** – the salvage value of the asset minus the taxes paid on the sale of the asset
  - **Net Salvage = Salvage + PV of tax shields**

Expansion Projects

- **Expansion Projects** – a new project, there are no old costs and revenues to complicate the analysis
- **Replacement Projects** – a project in which an old asset is replaced by a new asset
- 3-part analysis:
  - First compute initial cash flow
  - Compute annual operating cash flows
  - Discuss terminal cash flow → cash flow that occurs at the project's conclusion
- **Initial Cash Flows**
  - Firm usually incurs one-time expenses and costs when initiating a new investment
    - Sum of these one-time costs is the initial cash flow
  - -initial purchase price of new asset – installation/shipping cost of new asset – increase in net working capital = initial cash flow
    - All have minus sign in front because they are all cash outflows
  - **Initial Purchase Price**
    - Easiest and most accurate number to obtain
    - Includes any taxes, tariffs, or other expenses that are part of the cost
    - Also include installation and shipping
  - **Changes in Working Capital**
    - Expansion projects may require increases in net working capital
      - NWC = current assets – current liabilities
    - Also possible that a new asset will result in a reduction in net working capital if it allows increased efficiency in inventory management
      - Increases subtracted, decreases added
    - $\Delta NWC = \Delta CA - \Delta CL$
      - NWC = change in net working capital
      - CA = change in current assets (excluding cash)
      - CL = change in current liabilities
    - Investments in net working capital are often made in the early stages of a project

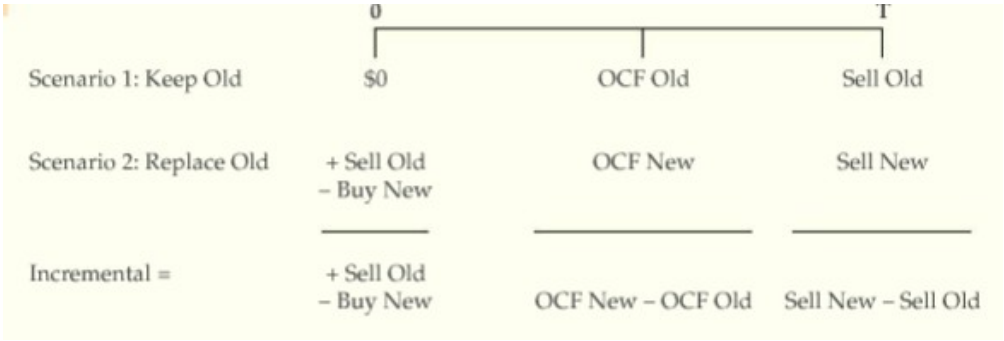
        - Amount of NWC usually tied to sales and fluctuates with sales
        - Increases in NWV represent additional cash outflow, decreases represent cash inflow
        - Usually assume that NWC is liquidated in the terminal year which generates a positive cash flow
- **Operating Cash Flows** – revenues less costs (including fixed costs) and taxes. Also equal to net income plus interest and depreciation
    - Only when present value of inflows exceeds the present value of outflows will the project be accepted
    - Adjusts accounting earnings for depreciation
    - Only incremental changes are relevant
        - Incremental revenues = new sales from expansion project
        - Incremental costs more challenging to calculate
    - If EBIT is negative, indicating a loss, this loss will offset other income and result in a tax savings
    - $OCF = R - OE - Depr - Tax + Depr$
        - OCF = operating cash flow
        - R = sales revenue
        - OE = operating expenses
        - Depr = depreciation expense
        - Tax = corporate taxes
    - $OCF = EBIT \times (1 - T) + Depr$
    - **Net Operating Profit After Tax (NOPAT) = EBIT – TAXES**
        - Similar to net income, except for the omission of interest
    - **OCF = NOPAT + Depr**
- **Terminal Cash Flows** – cash flows spend (or received) in the final year of a project
    - Final year of a project often involves additional outflows and inflows
    - + Operating cash flows + net salvage value of asset + decrease in net working capital = terminal cash flow
    - **Net Salvage = Salvage + PV of tax shields**

Class Notes

- Tax Effects of Salvage
  - Sale of assets may affect future taxes
  - Treatment of assets when they are sold is complicated, depending on:
    - Whether the sale price is above or below the purchase price
    - Whether the asset class is closed or not
      - Assets are pooled, if it is the only asset in the pool, class is closed when asset is sold
    - Whether it is above or below its UCC (how much of my asset have I not depreciated yet)
      - If above UCC, government will say asset is over depreciated and collect tax
  - If you sell something for more than you bought it for, capital gain → taxable
- Selling an Asset from an Ongoing Pool
  - Salvage price deducted from the balance in the asset pool
  - If S < UCC, then the asset continues to generate a tax deduction even after its gone
  - If S > UCC, then disposition decreases tax shields from other assets in that class forever
  - Tax savings decrease every year due to decreasing UCC
- **Replacement Projects**
  - Replacing existing machines
  - Less risky than expansion projects → relies significantly on growing revenue
    - A lot more uncertainty
    - Replacement less risky because we have more control over the cost
  - NPV = -$cash + OCF/(1+k) + CF(ty)/(1+k)^2 (delta for first 2 terms)
  - CF(ty) = OCF(ty) + S + PV(ts) + NWC (all delta)

Replacement Projects

- Compare 2 scenarios:
  - Keeping the old equipment
  - Replacing it
- Calculate the cash flows associated with the replacement scenario and subtract the cash flows that would have been received with the old equipment
  - Differences = incremental cash flows associated with the replacement
- To assess a replacement decision, we estimate the net present value of the incremental cash flows → if NPV > 0, then replacement is optimal



- **Initial Cash Flows**
  - Includes acquisition (and installation) of the new asset which is offset by proceeds from selling the old asset
  - Cash outflows (inflows) if net working capital is increased (decreased)

(-) Price of new asset
+ Salvage value of old asset
(-) Increase in net working capital
= Initial cash flow

  - When asset is replaced, CCA system adds the cost of the new machine to the asset class and deducts the salve value of the old machine
    - Always increases UCC balance in class
    - No tax implications associated with the purchase of the new asset or the sale of the old asset at the time of replacement
- **Operating Cash Flows**
  - Difference between operating cash flows after replacement and the operating cash flwos with the old asset

Table 10.7 Calculation of Operating Cash Flows for a Replacement Project

+	(New sales revenue – Old sales revenue)
–	(New operating expenses – Old operating expenses)
=	Incremental Gross profit (ΔEBITDA)
–	(New depreciation – Old depreciation)
=	ΔEBIT
–	Taxes
=	Incremental net profit after tax (ΔNOPAT)
+	(New depreciation – Old depreciation)
=	Incremental operating cash flow (ΔOCF)

  - Incremental depreciation → amount by which depreciation changes because of the purchase of the new machine
    - When asset is replaced, salvage value of old machine removed from pooled UCC of the asset class and capital cost of new asset is added
    - Change to UCC of the class = incremental capital cost (cost of new machine – salvage value of old machine)
- **Terminal Cash Flows**

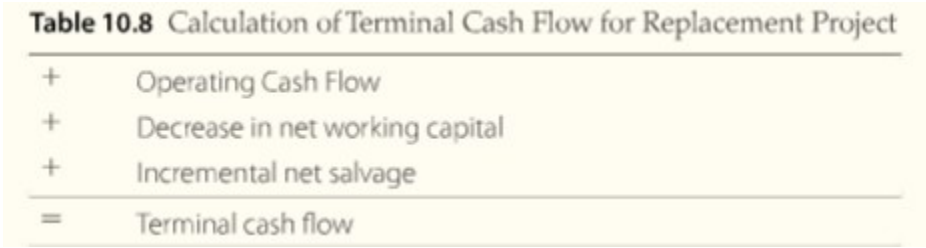
- Cash flows in the terminal year
- 

Table 10.8 Calculation of Terminal Cash Flow for Replacement Project

+	Operating Cash Flow
+	Decrease in net working capital
+	Incremental net salvage
=	Terminal cash flow

- Typical project, increase in net working capital when project is started
  - When project ends, cash invested in working capital no longer needed and is returned to investors
  - Decrease in net working capital = positive cash flow in terminal year
- **Net Incremental Salvage**
  - Incremental salvage = salvage of new machine – salvage of old machine

Capital Budgeting Refinements

- Problems in capital budgeting process:
  - Estimating cash flows
  - Adjusting the analysis to compare projects with different lives
  - Using sensitivity analysis to test the stability of our analysis
- **Incremental cash Flows**
  - Rules to follow when estimating cash flows:
    - Aggressively seek and include **indirect costs**
      - **Indirect Costs** – a cost to a business that is not directly related to making the product or service
    - Disregard **sunk costs**
      - **Sunk Costs** – irreversible past costs
    - Include **opportunity costs**
      - **Opportunity Costs** – the full cost of a choice, value of the best forsaken opportunity
    - Consider **externalities**
      - **Externalities** – a cost (or benefit) that accrues to a third person who is not a direct party to a transaction, a side effect
    - Adjust for taxes
    - Ignore financing costs
- **Projects with Different Lives**
  - 2 methods for comparing projects with different lives
  - Both assume that when the short-term project concludes, another similar project will be available
  - **Replacement Chain Approach** – an approach to comparing and choosing between 2 projects with unequal lives. Involves repeating each project until a common length is achieved and them comparing NPVs of the 2 streams of cash flows
    - E.g. 5 year vs. 10 year project → short project is doubled so that it will take the same amount of time as the long one
    - NPV are then computer and compared in the usual way

        - Becomes tedious if the projects are not even multiples of each other
    - **Equivalent Annual Annuity Method** – essentially the NPV per year. It is an annual dollar amount (for each year of a project's life) that has a present value equal to the project's NPV
        - Assumes both short and long projects can be repeated forever
        - Cash flows from each converted into annuities
        - Although these particular projects will not be repeated, a firm is a going concern in that similar substitute projects will be available
        - Steps:
            - Compute NPV for each project
            - Find the annuity payments that have the same present value as the NPV and the same number of periods as the project
                - Treat NPV as present value of an annuity and solve for PMT
    - Problems with attempting to correct for unequal lives
        - Similar replacement jobs may not be available as assumed by both methods
        - Because of inflation, subsequent costs may be higher than initially projected
        - All of the errors with estimating cash flows are compounded when we assume the cash flows will repeat
- **Sensitivity Analysis**
    - Many estimates are usually educated guesses → extremely difficult to make estimates about costs and revenues for a product or activity that has never been attempted
    - **Sensitivity Analysis** – a series of analyses that reflect the effect of different assumptions
    - Tells analyst how sensitive the results are to changes in the estimates
    - If very small changes in the sales project makes a large difference in the NPV, then the estimates may require additional review
    - "what if"
    - Following steps help produce data needed to make difficult cash budgeting decisions
        - Prepare a complete cash flow estimation schedule using a spreadsheet
        - Compute the NPV of the cash flow
        - Vary each of the uncertain estimates over its reasonable range and record the resulting NPV from each change in a table
        - Graph results of step 3
        - Perform scenario analysis → prepare additional evaluations by changing more than one input
    - Will give analyst clearer view of the project and will better understand the risk involved

Lecture Notes

- Mutually exclusive project, pick one or the other

- Replacement chain → if product is adding value, wouldn't you just keep doing it again?
    - How many years in the future do I have to go for these projects do have the same life
    - Compare NPV at that year
- Equivalent annual annuity → compare projects on annual benefit basis
    - EAA = NPV/PVIFA
- Sensitivity Analysis

Garcia Corp. is currently evaluating a new carbonated grape juice product called Grapeful Soda. Grapeful is superior to competing grape products like Grape Nehi. Production facilities for the Grapeful product would be set up in an unused section of Garcia's main plant. Machinery with an estimated cost of $300,000 will be purchased to manufacture the soda. Garcia's inventories would have to be increased by $10,000 at the time of the initial investment.

The machinery has a capital cost allowance (CCA) depreciation rate of 25%. The machinery is expected to have a salvage value of $110,742 after 4 years of use.

Garcia's management expects to sell 200,000 bottles of the new product in each of the next 4 years at a price of $2.00 per bottle, but $1.50 per bottle would be needed to cover fixed and variable operating costs. Garcia's tax rate is 40%, and the overall cost of capital is 10%.

BU393 Notes
Chapter 11
Cost of Capital

Computing the Cost of Debt, Preferred Shares, and Equity

- **Internal Rates of Return** – the discount rate that sets the present value of the cash inflows equal to the present value of the cash outflows
    - Discount rate that sets NPV to 0
- **Cost of Capital** – the cost, expressed as a percentage rate, that a firm must pay investors for the use of debt and equity financing
- **Why Compute a Cost of Capital?**
    - **Weighted Average Cost of Capital (WACC)** – the average cost of debt and equity financing where the average is computed as a weighted average using the long-term target weights of debt and equity in the balance sheet.
        - Also referred to as the average cost of funds
- **Interpreting the Weighted Average Cost of Capital**
    - Firm must earn at least the WACC or the value of the firm will fall
    - WACC is the return a firm must earn on its investments
    - When firms evaluate projects that are very different from historical investments, they must adjust the discount rate to reflect risk appropriately
- **Computing the Cost of Each Type of Security**
    - Each source of funds has a unique cost

- **After-Tax Cost of Debt**
  - Cost of debt is the return that the firm's lenders demand on new borrowing
    - Interest rate on new borrowing → observe it from the interest rates quoted in the bond markets
  - If a company has existing bonds trading in the bond market, then the cost of debt is the yield to maturity of those bonds
  - Interest on debt is tax deductible
    - Lowers cost of financing because the government is paying a portion of the debt expense by reducing the taxes due from the company
    - Reduces cost of debt financing by (1 – T)
      - T = firm's tax rate
  - **After-Tax Cost of Debt = $k_d(1 - T)$**
    - Reflects cost of borrowing at current market interest rates
      - Rate at which new debt could be issued
    - Rises and falls with market rates
- **Cost of Preferred Shares**
  - Dividends are not tax deductible
  - After-tax cost of preferred shares debt higher than the after-tax cost of similarly risky debt
    - One reason why firms are reluctant to issue preferred shares
  - **$k_d = D/P_{preferred}$**
- **Cost of Common Shares**
  - Finding the cost of equity is far more difficult than finding the cost of either debt or preferred shares
  - More uncertainty with cost of equity → several methods to compute its cost
  - Most expensive type of capital available
  - **Capital Asset Pricing Model (CAPM)** – describes the relationship between the required return, or cost of common stock equity capital, and the nondiversifiable risk of the firm as measure by the beta coefficient
    - **$k_e = k_F + beta(k_M - k_F)$**
    - theoretically the accurate method
    - does not give confident results due to volatility of market
  - If investors require a specific return, managers must earn that return or investors will sell the shares
    - Price falls → replacement of managers
  - **Constant Growth Model**
    - **$k_e = D_1/P_0 + g$**
    - computes cost of equity given the current market price of the shares, an estimate of next period's dividend, and the constant growth rate the firm is expected to experience over the long run
    - difficult part of this model is estimating the growth rate
  - **Bond Yield Plus Premium**
    - Involves adjusting the cost of debt by adding a **risk premium**

        - **Risk Premium** – an additional return investors require due to the increased risk one investment has over another
    - Based on the fact that bond yields can be computer with a reasonable degree of accuracy
    - **$k_e = k_d +$ risk premium**
    - Risk premium usually between 3-5%
    - Better estimate for risk premium is to use historical data to compute k_e and k_d
        - Should be relatively stable
- **Reconciling the Models**
    - Use all methods for which you have the required date
    - More methods you use, more confidence you can have in final result
    - Need to determine one rate that best represents the true cost of equity capital
        - Can get average of all methods used or sometimes one measure will be more accurate than the others based on confidence of data inputted into the computations

Computing a Weighted Average Cost of Capital

- **Target Mix** – the proportions of debt, equity and preferred stock a firm wants in its capital structure
- **Computing Capital Structure Weights**
    - **V = E + D + P**
        - V = value of all the company's securities
        - E = value of equity
        - D = value of debt
        - P = value of preferred shares
    - $w_d = D/V$
    - $w_p = P/V$
    - $w_e = E/V$
    - sum of weights must equal 1
- **Putting it All Together: Computing the WACC**
    - Multiply each component by the proportion it occupies in the target mix

Divisional Cost of Capital

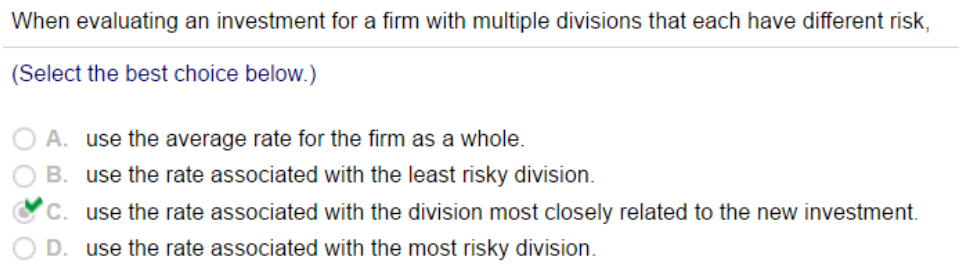
- Companies with multiple divisions should not use a single corporate WACC to evaluate projects, they should calculate a divisional cost of capital for each business unit
- Separate estimates must reflect the business risk of the division and the different financing mix of the division

Class Notes

Cost of Capital

- Debt Capital = loans
- Equity Capital = common shares
- Capital from preferred shares
- **Weighted Average Cost of Capital**

- Minimum required rate of return that the firm must earn on any new projects to keep all suppliers of capital satisfied (i.e. to keep the value of the firm unchanged)



Which of the following is an advantage of the net present value (NPV) technique for evaluating cash flows?
A. Easy comparison of separate NPV projects.
B. 100% accurate.
C. Ease of understanding.
D. Discount rate adjusts for risk.
ANSWER: D

BU393 Notes
Chapter 13
Dividends, Share Repurchases, and Splits

Lecture Notes

- Want dividends to remain relatively constant
  - Stock price would be volatile if dividend payments constantly changed
- Cum-dividend day 3 BUSINESS days before date of record
- Cannot profit from short-selling before dividend is released because you'll have to pay back the real owner of the stock the dividend that was distributed because they were expecting it

BU393 Notes
Chapter 14.1 & 14.3
Financial Planning

Chapter 14: Financial Planning (14.1 & 14.3)
Introduction

- **Strategic Planning** – the process of determining the company's goals, the direction the company will take and how to allocate resources to achieve those goals
- **Financial Planning** – the process of forecasting the financial implications of the strategic plan in order to identify how much money is needed to fulfill the plan. Short-term financial planning focuses on week-by-week cash receipts and disbursements to identify short-term cash imbalances. Long-term financial planning involves forecasting financial statements to identify shortages (or excesses) of capital
  - allows the financial manager to anticipate shortages of money before it occurs and time new issues advantageously for the firm

- strategic plan ➔ long-term financial plan ➔ short-term financial plan (cash budget)
- **Discounted Cash Flow (DCF) Valuation** – a company valuation technique. Analogous to a project NPV calculation. The company's free cash flows are discounted at the weighted average cost of capital. The present value is the value of the whole company (debt plus equity)
- **Sales Forecast** – the prediction of the firm's sales over a given period, based on external and/or internal data, and used as the key input to the financial planning process

LO1: Sales Forecast

- **Basic Sales Forecast**
  - **Driver** – an underlying economic factor that determines the future path of a variable. For example, the price of gasoline is one driver for car sales
  - $Sales_t = P_t \times Q_t$
    - Sales(t) = sales revenue in period t
    - P(t) = the price of the product in period t
    - Q(t) = quantity sold in period t
  - Simplest quantity forecast (based on an industry sales forecast and a market share forecast)
    - $Q_t = IQ_t \times s_t$
      - IQ(t) = industry quantity in period t
      - s(t) = market share of the firm in period t
  - industry forecasts usually provide a rate of growth of sales (quantity) in the future
  - market share and price more difficult to forecast
  - Market share depends on:
    - Pricing
    - Marketing
    - Product innovation
    - Competitive environment
  - Price depends on:
    - Inflation
    - Competition
  - To forecast sales, must forecast underlying drivers
- **Sales Forecast for Retailers**
  - **Same Stores Sales Growth (SSSG)** – the rate of growth of sales in existing stores (not including sales growth due to the addition of new stores). Also, equal to the growth of sales per square foot
    - Likely to rise with inflation
  - High level of competition usually leads to slow price growth

LO3: Financial Statements Forecasting

- **POS** – percent of sales method
  - Almost every accounting item is related to sales with a ratio
- **Simple Forecast**
  - many accounts, particularly capital accounts on the right-hand side, do not maintain a proportionate relationship to sales
    - equity does not rise with sales, it increases because of retained earnings (net income)

Table 14.6 Forecasted Financial Statements for Mug o' Pizza

Income Statement

	Historic	Ratio to Sales	Forecast
Sales	$2,000		$3,000
Cost of Goods Sold	$1,600	0.8	$2,400
Net Income	$400		$600

Balance Sheet

	Historic	Ratio to Sales	Forecast		Historic	Forecast
Assets	$3,000	1.50	$4,500	Debt	$500	$500
				Equity	$2,500	$3,100
Total	$3,000		$4,500	Total	$3,000	$3,600

-
- AFN = $900 shortfall of capital (4500-3600)
    - firm cannot afford to increase assets if funds cannot be raised ➔ will not be able to increase sales as planned
    - if AFN obtained by borrowing ➔ debt rises to 1400, balance sheet will balance
    - if AFN obtained by issuing equity
- When adding AFN to either debt or equity:
    - **Plug Account** or **Plug Variable** – the account used to make the balance sheet balance when forecasting financial statements
- Choice of plug accounts is up to management

- **Forecasting Accounts Not Tied to Sales**
    - 3 types of accounts:
        - Accounts tied to sales
        - Plug accounts
        - Accounts not tied to sales
            - Retained earnings
            - Taxes
                - Percentage of taxable income
            - Dividends
                - Percentage of net income
            - Goodwill
                - Constant
    - How to handle 4 accounts not tied to sales:
        - **Interest**
            - $Interest\ Expense = PV_{t-1} \times i$
        - **Depreciation**
            - $Depreciation\ Expense = dr \times Book\ Valu\ e_{t-1}$
                - Book value = purchase price of asset – accumulated depreciation
            - Incorporating CAPEX:
                - $Depreciation\ Expense = dr \times \left(Book\ Valu\ e_{t-1} + CAPEX_t \right)$
        - **Capital Expenditures (CAPEX)**
            - Divided into 2 parts:
                - **Maintenance CAPEX** – the assets that are purchases to replace work out equipment
                - **Growth CAPEX** – the assets that must be purchased in order to grow sales

        - **Net Fixed Assets (net property, plant, and equipment)**
            - $Net_t = Net_{t-1} - Depreciation_t$
                - Net(t) refers to net fixed assets at the end of year t
            - Incorporating CAPEX
                - $Net_t = Net_{t-1} - Depreciation_t + CAPEX_t$
- **Income Statement Forecast**
    - **Statutory Rate** – the legally imposed corporate income tax rate
    - **Apparent Tax Rate** – just the amount of taxes claimed on the income statement divided by pre-tax income
    - Dividends and retained earnings are forecasted by assuming that the firm's historical payout ratio remains constant
- **Balance Sheet Forecast**
    - **Current Assets & Current Liabilities**
        - Percentage of sales
        - Dutch Oven has no debt
    - **Long-Term Assets**
        - Not a percentage of sales
        - Forecast at a constant level equal to their historical value
    - **Debt & Equity – The Plug Variables**
        - Determined as a matter of financial policy
        - Function of a firm's target capital structure
        - If firm has less debt than its target level, it will raise capital by borrowing
        - If it has too much debt, it will raise capital by selling new shares

BU393 Notes
Chapter 17.1
Corporate Valuation

Introduction

- Key to successful investing is to buy good companies at cheap prices
- To identify cheap companies, portfolio managers compare the market price to the fair price
- 2 important parts of the investment banking business:
    - New issues of equity
    - Mergers and acquisitions
- **Discounted Cash Flow (DCF) Valuation** – a company valuation technique. Analogous to a project NPV calculation. The company's free cash flows are discounted at the weighted average cost of capital. The present value is the value of the whole company (debt plus equity)
- **CAPEX** – purchases of fixed assets like property, plant, and equipment. Also referred to as capital expenditures

LO1: Advanced Financial Statements Forecasting

- **Net Fixed Assets**
    - $Net_t = Net_{t-1} - Depreciation_t + CAPEX_t$
        - Capital asset identity

    - Net fixed assets are the aggregate book value of all the company's assets
    - CAPEX is the purchase of new assets
- **Depreciation**
    - Related to fixed assets
    - **Declining Balance Depreciation System** – an accelerated depreciation system where the amount of depreciation charged to an asset declines over time. The amount of depreciation in any period is calculated as the depreciation rate multiplied by the book value of the asset
    - Deducts a fixed percentage of an asset's value each year
    - $Depreciation\ Expense = dr \times (Net_{t-1} + CAPEX_t)$
    - **Estimating the Average Depreciation Rate**
        - Necessary to find an expression for it using the historical income statement and balance sheet
        - $dr = \frac{Depreciation_t}{Net_t + Depreciation_t}$
        - Adding depreciation back to year end net fixed assets gives us the amount that was to be depreciated: net fixed assets from las year plus CAPEX from this year
- **CAPEX**
    - Divided into 2 parts
        - **Maintenance CAPEX** – the assets that are purchased to replace worn out equipment
            - Tied to the existing stock of fixed assets
            - Amount necessary to make net fixed assets at the end of the year equal to the value at the end of the previous year
            - $mCAPEX_t = \frac{dr}{1-dr} \times Net_{t-1}$
        - **Growth CAPEX** – the assets that must be purchased in order to grow sales
            - Tied to sales growth
            - $gx = \frac{gCAPEX_t}{\Delta Sales_t}$
                - gx = ratio of growth CAPEX to new sales
            - if gx = 0.2, that means the company needs to invest 20 cents into growth CAPEX to support each new dollar of sales
            - amount of growth CAPEX forecasted simply by multiplying the change in sales by this ratio
            - calculated from historical financial statements
            - 2 characteristics
                - In periods of declining sales, growth CAPEX is 0 by definition → it cannot be negative
                - CAPEX can be lumpy → companies don't add capacity in small amounts. Company that builds a

new factory may have a gx ratio greater than 1 in the year of construction
        - Value should not be used to forecast financial statements as it will cause free cash flows to be negative
    - **Total CAPEX**
        - $CAPEX_t = Net_t - Net_{t-1} + Depreciation_t$

17.2 – Free Cash Flow

- **Free Cash Flow**
    - **FCF** → amount of money that you would receive at the end of each year if you were the only owner of a company that had no debt
        - If company has debt, FCF = amount of money that you would receive if you were the sole owner + lender (of debt)
    - Operating Cash Flow – Investment in NWC – Investments in Fixed Assets = FCF
- **Operating Cash Flow** – revenues less costs (including fixed costs) and taxes. Also equal to net income plus interest and depreciation
    - Sales – COGS – SG&A – Taxes = Operating Cash Flow
    - Do not include depreciation because it is a non-cash expense
    - Do not subtract interest because it is a cash flow to bondholders
    - FCF is the amount available to be paid to bondholders and shareholders, so we do not want to subtract interest when calculating it
    - Taxes = T x (Sales – COGS – SG&A – Depreciation)
        - Taxes = T x EBIT
        - This method overestimates taxes compared to taxes on the income statement
    - **Interest Tax Shield** – equal to the product of the interest expense and the corporate tax rate. It is the amount by which taxes are reduced due to interest tax deductibility
    - **OCF = EBIT x (1-T) + Depreciation**
- **Investments in Net Working Capital**
    - **Net Working Capital (NWC)** – current assets minus current liabilities. When we calculate NWC for the purposes of computing free cash flow we omit cash from current assets and short-term debt from current liabilities
        - Increase → use of cash
        - Reduction → source of cash
    - Subtract increase in NWC from OCF (decrease = negative increase)
    - When calculating FCF, NWC define as:
        - NWC = (short-term assets – Cash) – (Current liabilities – Short term debt)
    - Investment in NWC is the change in NWC
        - E.g. if inventory or accounts receivable increase, then that is an investment in net working capital (use of FCF)
- **CAPEX and Free Cash Flow**

- CAPEX → amount of money spent on purchases of long-term assets such as machinery and equipment

- **The Free Cash Flow Identity**
  - FCF can go 3 places:
    - Into the cash account
    - To shareholders
      - Receive dividends or share repurchases
    - To lenders
      - Receive interest and principal payments
  - **FCF = Change in Cash + Cash Flow to (from) Claimholders – Interest Tax Shield**
  - Claimholders = shareholders and the firm's lenders
  - New debt means additional borrowing
  - New equity represents a new issue of shares

17.3 – Discounted Free Cash Flow Valuation

- **Overview of the DCF Methods**
  - A business is worth the amount the highest bidder is willing to pay for it
  - Most a bidder will pay for a business is the present value of the free cash flows
    - Value of business is the PV of the free cash flows
  - To receive all the cash flows from a company, an investor must own all of the securities issued by that company
    - Value of a firm is the sum of the values of its issued securities
  - Both perspectives are equivalent
  - Similar to finding NPV of a project, but value entire company instead of a singular project
- **The Cost of Capital**
  - Discounts FCF generated by the assets
  - Use WACC as discount rate
  - Assumption underlying WACC
    - Financing proportions (i.e. debt-to-value ratio) are assumed to remain constant over the company's life
  - Use after-tax cost of debt in the calculation of WACC → captures interest tax shield so we can omit it from the calculation of OCF
- **Forecast Timeline**
  - Forecast broken down into 2 sequential parts
    - **Forecast Period** – the period of time over which the business projection (forecast) is prepared
      - Short term
      - Allow that sales growth can vary
    - **Terminal Growth Period** – the infinite time period starting at the end of the forecast period
      - Long term
      - Sales (and FCF) assumed to grow in perpetuity at a constant rate
- **DCF Valuation**

- Value of the firm is equal to the sum of the PV of cash flows and the **redundant assets** when discounted at the WACC
  - **Redundant Assets** – assets that do not contribute to operations. For example, cash and unused land
    - E.g. tract of land that a company holds as a speculative investment and does not intend to use in its manufacturing operations
    - Cash and marketable securities
- **V = PV of FCF + Redundant Assets**
- Assets of company can be divided into those that are expected to provide an ongoing stream of payments, and those that are not
  - **Operating Assets** – assets that are used to produce operating cash flows. Total assets minus redundant assets
- Present value of FCF is equal to the sum of the PV of the cash flows from the forecast period and the terminal period
- $PV_{FP} = \sum_{t=1}^{n} \frac{FCF_t}{(1+k_{WACC})^t}$
  - n = length of the forecast period
- **Terminal Value** – the present value of the terminal period cash flows as of the beginning of the terminal period. Equal to the fair value of the company at the beginning of the terminal period
- $PV_{TP} = \frac{1}{(1+k_{WACC})^t} \times \frac{FCF_n(1+g)}{k_{WACC} - g}$
- Using these expressions, value of firm can be re-expressed as:
  - $V = (PV_{FP} + PV_{TP}) + Redundant\ Assets$

- **Estimating the Share Price**
  - **V = E + D**
  - Value of the firm = value of the debt and equity securities
  - Use book values for these values
    - Not a bad approximation for market value
  - P = E/N
    - P = stock price
    - E = aggregate value of equity
    - N = number of shares outstanding

17.4 – DCF: An Example

- **Forecasting the Financial Statements**
  - **Forecast for CAPEX, Depreciation, and Net Fixed Assets**
  - **Forecasting Free Cash Flow**
    -