MSCI 261 Midterm Review 2 (Chpt. 6-9)

Depreciation

- **Market value**: value at which an asset can be sold in a market (usually estimated)
- **Book value**: value calculated for accounting purposes, using a depreciation model
- **Scrap value**: value at the end of an asset's <u>physical</u> life (when it's broken up for its parts)
- **Salavage value**: value at the end of an asset's <u>useful</u> life (when it's sold)
- **Straight-line depreciation**: linear diminishment of book value

$$D_{sl}(n) = \frac{P - S}{N} = \text{amount of depreciation in period } n$$

$$BV_{sl}(n) = P - nD_{sl} = \text{book value at the end of period } n$$

  - P = current market value/purchase price
  - S = salvage value after N periods
  - N = # of periods in useful life

- **Declining-balance depreciation**: proportional diminishment of book value

$$D_{db}(n) = d \cdot BV_{db}(n - 1) = \text{amount of depreciation in period } n$$

$$BV_{db}(n) = P(1 - d)^n = \text{book value at the end of period } n$$

$$d = \sqrt[N]{\frac{S}{P}} = \text{depreciation rate, given } P, S, \text{ and } N$$

Financial Accounting

- **Balance sheet**: snapshot of a firm's financial position at a point in time
  - (Current assets + long-term assets) = (Current liabilities + long-term liabilities) + (Owner's equity)
- **Income statement**: summary of a firm's revenues and expenses over an accounting period
  - Income before taxes = Revenues − expenses
  - Net income = Income before taxes − taxes
- Liquidity ratios: ability of a firm to meet its current liability obligations
  - **Working capital** = Current assets - Current liabilities
  - **Current ratio/Working capital ratio** $= \dfrac{\text{Current assets}}{\text{Current liabilities}}$
  - **Acid-test ratio/quick ratio** $= \dfrac{\text{Quick assets}}{\text{Current liabilities}}$
    - Quick assets = Current assets − Inventories − Prepaid items
- Leverage/debt-management ratios: how much a firm relies on debt for its operations

- **Equity ratio** $= \dfrac{\text{Owner's equity}}{\text{Total assets}}$

- Efficiency/asset-management ratios: how efficiently a firm uses its assets

  - **Inventory-turnover ratio** $= \dfrac{\text{Sales}}{\text{Inventories}}$

- Profitability ratios: how productively a firm employs its assets to produce profit

  - **Return-on-assets ratio** $= \dfrac{\text{Net income (before extraordinary items)}}{\text{Total assets}}$

  - **Return-on-equity ratio** $= \dfrac{\text{Net income (before extraordinary items)}}{\text{Total equity}}$

Replacement Decisions

- **Equivalent Annual Cost (EAC)**

Taxes

- As an approximation:
  - $\text{Profit}_{\text{after-tax}} = \text{Profit}_{\text{before-tax}} \times (1 - t)$
  - $\text{MARR}_{\text{after-tax}} = \text{MARR}_{\text{before-tax}} \times (1 - t)$
  - $\text{IRR}_{\text{after-tax}} = \text{IRR}_{\text{before-tax}} \times (1 - t)$
  - Where $t =$ corporate tax rate

- Effects of taxes on cash flows (straight-line):
  - $-\text{First cost}_{at} = -\text{First cost}_{bt} + \text{First cost}_{bt} \times t/N \times (P/A, i, N)$
    - First cost $\times t/N =$ annual tax savings due to the depreciation expense
  - $\text{Savings}_{at} = \text{Savings}_{bt} \times (1 - t)$
  - $\text{Salvage value}_{at} = \text{Salvage value}_{bt} \times (1 - t)$

- Businesses want to depreciate assets as quickly as possible = receive tax savings earlier = savings are worth more

- **Capital Cost Allowance (CCA)**: maximum amount of depreciation that a business can claim in a year
  - Usually calculated as a percentage of assets: the **CCA rate**

- **Undepreciated Capital Cost (UCC)**: value of assets from which the CCA for a year is calculated

  $$UCC_{i+1} = UCC_i + \text{purchases}_i - \text{salvages}_i - CCA_i$$

- **Half-year rule**: for net purchases, half is added to the base UCC used to calculate CCA for the current year, and half is added to that of the next year
  - Intended to reduce tax savings
  - Without half-year rule: $UCC_n = P(1 - d)^n$

- With half-year rule: $UCC_n = P(1 - \frac{d}{2})(1 - d)^{n-1}$

- **Capital tax factor**: present worth of an asset, taking into account all future tax benefits due to depreciation

$$CTF = 1 - \frac{td(1 + i/2)}{(i + d)(1 + i)}$$

- **Capital salvage factor**: present worth of an asset's salvage value, taking into account the ongoing effect of tax benefits

$$CSF = 1 - \frac{td}{i + d}$$

- Effects of taxes on cash flows (declining-balance, with half-year rule):
    - First cost$_{at}$ = First cost$_{bt} \times CTF$
    - Savings$_{at}$ = Savings$_{bt} \times (1 - t)$
    - Salvage value$_{at}$ = Salvage value$_{bt} \times CSF$
    - e.g. finding the annual worth of a purchase with taxes, given first cost, annual revenue, and salvage value (all before taxes):

$$AW = -P_{bt}(A/P, i, N)CTF + A_{bt}(1 - t) + S_{bt}(A/F, i, N)CSF$$

Inflation