FINM3401 Notes

Topic 1 – Capital Budgeting

NPV

- Accurate and reliable
- Time Value of Money
- Can take into account risk
- Invest in positive NPV
- Value is the present value of expected cash flows
- Use appropriate discount rate

1. Project Cash Flows
2. Determine Appropriate Discount Rate (Topic 2)
3. Calculate NPV

Incremental effect of project:

- **Free Cash Flow**

$$\text{Free Cash Flow} = \overbrace{(\text{Revenues} - \text{Costs} - \text{Depreciation}) \times (1 - \tau_c)}^{\text{Unlevered Net Income}} + \text{Depreciation} - \text{CapEx} - \Delta NWC$$

- **or**

$$\text{Free Cash Flow} = (\text{Revenues} - \text{Costs}) \times (1 - \tau_c) - \text{CapEx} - \Delta NWC + \tau_c \times \text{Depreciation}$$

- The Last term $\tau_c \times Depreciation$ is called the depreciation tax shield.

Incremental Earnings Forecast
Revenue
- Costs
= EBITDA
- Depreciation and Amortisation
= EBIT
- Tax
= Unlevered net income (EBI)

Free Cash Flow to Firm
Unlevered Net Income
+ Depreciation and Amortisation
- CapEx
- ΔNWC
+(After tax Cash Flow from Asset Sale)
= FCF to Firm

- After Tax Cash Flow from Asset Sale

= Sale Price – tax on gain on sale

- Gain on sale = Sale Price – Book Value
- Book Value = Purchase Price – Accumulated Depreciation

$$NPV = \sum_{t=1}^{n} \frac{FCF_t}{(1+r)^t}$$

Equivalent annual benefit (when project have different lifes):

$$EAB = \frac{NPV}{\frac{1}{r}\left[1 - \frac{1}{(1+r)^t}\right]}$$

Profitability Index = NPV/Initial Investment

- Measures value created for every $1 of investment
- Can be used when resources constrained

Break Even Analysis

- The break-even level of an input is the level that causes the NPV of the investment to equal 0

Sensitivity Analysis

- Shows how NPV varies with change
- Change one assumption, hold others constant

Scenario Analysis

- Considers the effect on NPV of simultaneously changing multiple assumptions.

Topic 2 – Cost of Capital

Discount Rate

- Reflects the risk of cash flows
- Reflects return required (capital providers)/ cost of capital (firm)
  - Time value of money
  - Risk
- Risk premium is determined by the amount of systematic risk (beta)
- CAPM
    - The estimate is provided by the Security Market Line equation:

$$E[r_i] = r_f + \underbrace{\beta_i[E(R_{Mkt}) - r_f]}_{\text{Risk Premium for Security i}}$$

    - Market risk premium ($E[R_{Mkt}]-r_f$): price of systematic risk
    - β_i: amount of systematic risk
    - r_f: risk free rate
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- Market risk premium: appropriate market proxy
  - Historical market risk premium
    - Use average excess return over risk free rate
    - Drawbacks: errors are large, backward looking
- Alternative Market Risk Premium

$$r_{Mkt} = \frac{Div_1}{P_0} + g = \text{Dividend Yield} + \text{Expected Dividend Growth Rate}$$

$$Market\ Risk\ Premium = \frac{Div_1}{P_0} + g - r_f$$

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- Risk Free Rate: consistent with time horizon (T-Bills, T-Bonds)
  - Not always risk free: inflation risk, real interest rate risk
- Beta
  - Expected Δ% in excess return of the asset for a 1% change in the excess return of the market portfolio
  - Systematic Risk

$$\beta_i = \frac{cov(r_i, r_m)}{Var(r_m)}$$

  - Covariance:
  - Beta Estimation: use historical returns
    - Regression of asset excess returns versus market excess returns
  - Beta should be project specific
  - All equity comparable
    - Asset Beta = Equity Beta for unlevered firm
    - Borrowing increases systematic risk for debt holders
    - Debt Beta = systematic risk for debt holders