FINANCIAL STATEMENT ANALYSIS

Net cash flow = Net income + Depreciation and amortization

DuPont equation: ROA = Net profit margin × Total assets turnover

DuPont equation: ROE = ROA × Equity multiplier

THE FINANCIAL ENVIRONMENT

Net proceeds from issue = Amount of issue – Flotation costs

Amount of issue = \[
\frac{\text{Amount needed}}{1 - \text{Flotation costs}} = \frac{(\text{Net proceeds}) + (\text{Other costs})}{1 - \text{Flotation costs}}
\]

TIME VALUE OF MONEY

Lump-sum (single) payments:

\[
FV_n = PV(1 + r)^n
\]

\[
PV = \frac{FV_n}{(1 + r)^n} = PV_n \left[ \frac{1}{(1 + r)^n} \right]
\]

Annuity payments:

\[
FVA_n = PMT \left[ \sum_{t=0}^{n-1} (1 + r)^t \right] = PMT \left[ \frac{(1 + r)^n - 1}{r} \right]
\]

\[
FVA(\text{DUE})_n = PMT \left[ \sum_{t=0}^{n-1} (1 + r)^t \times (1 + r) \right] = PMT \left[ \frac{(1 + r)^n - 1}{r} \right] \times (1 + r)
\]
PVAₙ = PMT \left[ \sum_{t=1}^{n} \frac{1}{(1 + r)^t} \right] = PMT \left[ \frac{1 - \frac{1}{(1 + r)^n}}{r} \right]

\text{PVA(DUE)ₙ} = PMT \left[ \sum_{t=1}^{n} \frac{1}{(1 + r)^t} \right] \times (1 + r) = PMT \left[ \frac{1 - \frac{1}{(1 + r)^n}}{r} \right] \times (1 + r)

\text{Perpetuities:}
\text{Present value of a perpetuity} = PVP = \frac{\text{Payment}}{\text{Interest rate}} = \frac{\text{PMT}}{r}

\text{Uneven cash flow streams:}
FV CFₙ = CF₁(1 + r)^{n-1} + \cdots + CFₙ(1 + r)^{n-1} = \sum_{t=0}^{n-1} CF_t(1 + r)^t

PV CFₙ = CF₁ \left[ \frac{1}{(1 + r)^1} \right] + \cdots + CFₙ \left[ \frac{1}{(1 + r)^n} \right] = \sum_{t=1}^{n} CF_t \left[ \frac{1}{(1 + r)^t} \right]

\text{Interest rates (yields):}
\text{Periodic rate} = f_{\text{PER}} = \frac{\text{Stated annual interest rate}}{\text{Number of interest payments per year}} = \frac{r_{\text{SIMPLE}}}{m}

\text{Number of interest periods} = n_{\text{PER}} = \text{Number of years} \times \text{Number of interest payments per year} = n_{\text{YRS}} \times m

\text{Effective annual rate} = EAR = f_{\text{EAR}} = \left(1 + \frac{r_{\text{SIMPLE}}}{m}\right)^m - 1.0 = (1 + f_{\text{PER}})^m - 1.0

\text{Annual percentage rate} = APR = f_{\text{PER}} \times m

\text{COST OF MONEY}

\text{Dollar return} = (\text{Dollar income}) + (\text{Capital gains})
= (\text{Dollar income}) + (\text{Ending value} - \text{Beginning value})

\text{Yield} = \frac{(\text{Dollar return})}{(\text{Beginning value})} = \frac{(\text{Dollar income} + \text{Capital gains})}{(\text{Beginning value})} = \frac{(\text{Dollar income} + (\text{Ending value} - \text{Beginning value}))}{(\text{Beginning value})}

\text{Rate of return} = r = \text{Risk-free rate} + \text{Risk premium} = r_{\text{RF}} + \text{RP}

\text{Rate of return} = r = r_{\text{RF}} + \text{RP} = r_{\text{RF}} + [\text{DRP} + \text{LP} + \text{MRP}]
= [r^* + \text{IP}] + [\text{DRP} + \text{LP} + \text{MRP}]

r_{\text{Treasury}} = r_{\text{RF}} + \text{MRP} = [r^* + \text{IP}] + \text{MRP}

\text{Yield on an n-year bond} = \left( \frac{\text{Interest rate in Year 1}}{n} \right) + \left( \frac{\text{Interest rate in Year 2}}{n} \right) + \cdots + \left( \frac{\text{Interest rate in Year n}}{n} \right) = R_1 + R_2 + \cdots + R_n
Valuation Concepts

General valuation model:

Value of an asset $V_0 = \text{PV of } CF = \frac{CF_1}{(1+r)^1} + \ldots + \frac{CF_n}{(1+r)^n} + \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$

Bond Valuation:

$V_d = \frac{\text{INT}}{(1+r_d)^1} + \ldots + \frac{\text{INT}+M}{(1+r_d)^N} = \text{INT} \left[ \frac{1}{r_d} \sum_{t=1}^{N} \frac{1}{(1+r_d)^t} \right] + M \left[ \frac{1}{(1+r_d)^N} \right]$

Bond yield $r_d = \text{YTM} - \text{Current Capital gains yield} = \frac{\text{INT}}{V_d} \left( V_d - V_{d0} \right)$

Stock Valuation:

Stock value $V_s = \hat{P}_0 = \hat{D}_1 \frac{(1+r_s)}{(1+r_g)} + \ldots + \hat{D}_\infty \frac{(1+r_s)}{(1+r_g)} = \sum_{t=1}^\infty \hat{D}_t \frac{(1+r_s)}{(1+r_g)}$

Constant growth stock: $P_0 = \frac{D_0 (1+g)}{r_s - g}$

Nonconstant growth stock: $P_0 = \frac{\hat{D}_1 (1+g)}{(1+r_g)} + \frac{\hat{D}_2 (1+g)}{(1+r_g)^2} + \ldots + \frac{\hat{D}_n (1+g)_{\text{norm}}}{(1+r_g)^n}$, where $\hat{P}_n = \frac{\hat{D}_n (1+g_{\text{norm}})}{r_s - g_{\text{norm}}}$

Stock yield $\hat{r}_s = \left( \text{Dividend yield} \right) + \left( \text{Capital gains yield} \right) = \frac{\hat{D}_1}{P_0} + g = \left( \frac{\hat{D}_1}{P_0} \right) + \left( \frac{\hat{P}_1 - P_0}{P_0} \right)$

Economic value added $\text{EVA} = \text{EBIT} (1-T) - \left( \frac{\text{Average cost of funds}}{\text{Invested capital}} \right)$

Risk and Rates of Return

Expected rate of return $\hat{r} = P_1 r_1 + P_2 r_2 + \ldots + P_n r_n = \sum_{i=1}^{n} P_i r_i$

Standard deviation $\sigma = \sqrt{\sigma^2} = \sqrt{\sum_{i=1}^{n} (r_i - \hat{r})^2 P_i}$
Variance = \sigma^2 = \sum_{i=1}^{n} (r_i - \bar{r})^2 \frac{P_r_i}{n-1}

\bar{r} = \frac{\dot{r}_1 + \dot{r}_2 + \ldots + \dot{r}_n}{n}

\text{Estimated } \sigma = s = \sqrt{\frac{\sum_{i=1}^{n} (\dot{r}_i - \bar{r})^2}{n-1}} \frac{1}{n} \sum_{i=1}^{n} \dot{r}_i

\text{Coefficient of variation} = CV = \frac{\text{Risk}}{\text{Return}} = \frac{\sigma}{\bar{r}}

\dot{r}_p = w_1 \dot{r}_1 + w_2 \dot{r}_2 + \ldots + w_N \dot{r}_N = \sum_{j=1}^{N} w_j \dot{r}_j

\beta_p = w_1 \beta_1 + w_2 \beta_2 + \ldots + w_N \beta_N = \sum_{j=1}^{N} w_j \beta_j

\text{Return} = \text{Risk-free return} + \text{Risk Premium} = r_{RF} + RP

RP = \text{Return} - r_{RF}

RP_{\text{Investment}} = RP_M \times \beta_{\text{Investment}}

r_{\text{Investment}} = r_{RF} + \text{RP}_{\text{Investment}}

= r_{RF} + (RP_M)\beta_{\text{Investment}}

= r_{RF} + (r_M - r_{RF})\beta_{\text{Investment}}

\textbf{Capital Budgeting}

\textit{Evaluation techniques:}

\text{Payback} = \left( \text{Number of years just before full recovery of original investment} \right) + \left( \frac{\text{Amount of the initial investment that is unrecovered at the start of the recovery year}}{\text{Total cash flow generated during the recovery year}} \right)

\text{Traditional payback—unadjusted cash flows are used}

\text{Discounted payback—discounted cash flows, or present values, are used}

\text{NPV} = CF_0 + \frac{\dot{CF}_1}{(1+r)^1} + \ldots + \frac{\dot{CF}_n}{(1+r)^n} = \sum_{t=0}^{n} \frac{\dot{CF}_t}{(1+r)^t}

\text{CF}_0 + \frac{\dot{CF}_1}{(1+IRR)^1} + \ldots + \frac{\dot{CF}_n}{(1+IRR)^n} = \sum_{t=0}^{n} \frac{\dot{CF}_t}{(1+IRR)^t} = 0

\text{IRR} = \text{internal rate of return}

\text{MIRR: PV of cash outflows} = \frac{\text{FV of cash inflows}}{(1+MIRR)^n} = \frac{TV}{(1+MIRR)^n} \ ; \sum_{t=0}^{n} \frac{\text{COF}_t}{(1+r)^t} = \sum_{t=0}^{n} \frac{\text{CIF}_t(1+r)^t}{(1+MIRR)^n}
Cash Flow Estimation

Net cash flow = Net income + Depreciation = Return on capital + Return of capital

Supplemental operating cash flow\(_t\) = \(\Delta\text{Cash revenues}\_t - \Delta\text{Cash expenses}\_t - \Delta\text{Taxes}\_t\)

\[= \Delta\text{NOI}\_t \times (1 - T) + \Delta\text{Dep}\_t\]

\[= (\Delta\text{NOI}_t + \Delta\text{Dep}_t) \times (1 - T) + T(\Delta\text{Dep}_t)\]

Cost of Capital

After-tax component cost of debt = (Bondholders’ required rate of return) \times (Tax savings associated with debt) = \(r_d - r_d \times T = r_d(1 - T) = \text{YTM}(1 - T)\)

Component cost of preferred stock = \(r_{ps} = \frac{D_{ps}}{P_0(1 - F)} = \frac{D_{ps}}{NP_0}\)

Component cost of retained earnings = \(r_s = r_{RF} + (r_{RF} - r_{RF})\beta_s = \frac{\hat{D}_1}{P_0} + g = \hat{r}_s\)

Component cost of new equity = \(r_e = \frac{\hat{D}_1}{P_0(1 - F)} + g = \frac{\hat{D}_1}{NP} + g\)

\[\text{WACC} = \left[\left(\begin{array}{c}
\text{Proportion of debt} \\
\text{of after-tax cost of debt}
\end{array}\right) \times \left(\begin{array}{c}
\text{Proportion of preferred stock} \\
\text{of cost of preferred stock}
\end{array}\right) + \left(\begin{array}{c}
\text{Proportion of common equity} \\
\text{of cost of common equity}
\end{array}\right) \right]
\]

\[= w_d r_dT + w_{ps} r_{ps} + w_s (r_s \text{ or } r_e)\]

WACC = Total dollar amount of lower cost of capital of a given type
Break Point = Proportion of this type of capital in the capital structure

Planning and Control

Full capacity sales = Sales level

\(\frac{\text{Percent of capacity used}}{\text{to generate sales level}}\)

Operating Breakeven Analysis

\[
\begin{align*}
\text{Sales} & = \text{Total operating costs} + \text{Total} \\
\text{revenues} & = (\text{Total variable costs} + \text{fixed costs}) \\
(P \times Q) & = \text{TOC} = (V \times Q) + F
\end{align*}
\]

\[
\begin{align*}
Q_{\text{OpBE}} & = \frac{F}{P-V} = \frac{F}{\text{Contribution margin}} \\
S_{\text{OpBE}} & = \frac{F}{1 - \left(\frac{V}{P}\right)} = \frac{F}{\text{Gross profit margin}}
\end{align*}
\]
Degree of operating leverage = DOL = \frac{\text{Percentage change in NOI}}{\text{Percentage change in sales}} = \frac{\frac{\Delta\text{NOI}}{\text{NOI}}}{\frac{\Delta\text{Sales}}{\text{Sales}}} = \frac{\frac{\Delta\text{EBIT}}{\text{EBIT}}}{\frac{\Delta\text{Sales}}{\text{Sales}}} = \frac{\frac{\Delta\text{EBIT}}{\text{EBIT}}}{\frac{\Delta\text{Q}}{\text{Q}}}

DOL = \frac{(Q \times P) - (Q \times V)}{(Q \times P) - (Q \times V) - F} = \frac{S - VC}{S - VC - F} = \frac{\text{Gross profit}}{\text{EBIT}}

Financial Breakeven Analysis

\[ \text{EPS} = \frac{\text{Earnings available to common stockholders}}{\text{Number of common shares outstanding}} = \frac{(\text{EBIT} - I)(1 - T) - D_{ps}}{\text{Shrs}_{C}} = 0 \]

\[ \text{EBIT}_{\text{FinBE}} = I + \frac{D_{ps}}{1 - T} \]

Degree of financial leverage = DFL = \frac{\text{Percent change in EPS}}{\text{Percent change in EBIT}} = \frac{\frac{\Delta\text{EPS}}{\text{EPS}}}{\frac{\Delta\text{EBIT}}{\text{EBIT}}}

DFL = \frac{\text{EBIT}}{\text{EBIT} - I} = \frac{\text{EBIT}}{\text{EBIT} - \text{[Financial BEP]}} \quad \text{Financial BEP} = I + \frac{D_{ps}}{1 - T}

DFL = \frac{\text{EBIT}}{\text{EBIT} - I} \quad \text{When there is no preferred stock.}

Degree of total leverage = DTL = \left( \frac{\frac{\Delta\text{EPS}}{\text{EPS}}}{\frac{\Delta\text{Sales}}{\text{Sales}}} \right) \times \left( \frac{\frac{\Delta\text{EBIT}}{\text{EBIT}}}{\frac{\Delta\text{EPS}}{\text{EPS}}} \right) = \text{DOL} \times \text{DFL}

\[ \text{DTL} = \frac{\text{Gross Profit}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBIT} - \text{[Financial BEP]}} = \frac{\text{Gross Profit}}{\text{EBIT} - \text{[Financial BEP]}} \]

\[ = \frac{S - VC}{\text{EBIT} - I} = \frac{Q(P - V)}{(Q(P - V) - F) - I} \quad \text{When there is no preferred stock.} \]