CFA Notes

Arthur Li

April 23, 2024

Contents

1 Tips and Tricks

1.1 Calculator Recommended Settings

Method 1.1.1.

i. *Reset calculator*: $\boxed{2ND}$ $\boxed{+|-}$

ii. *Increase to 9 decimal*: $\boxed{2ND}$ $\boxed{.}$ (FORMAT) $\boxed{9}$ $\boxed{\text{ENTER}}$

iii. *Set period to 1 year*: $\boxed{2ND}$ $\boxed{\text{I/Y}}$ (P/Y) $\boxed{1}$ $\boxed{\text{ENTER}}$

iv. *Set as AOS mode*: $\boxed{2ND}$ $\boxed{.}$ (FORMAT) $\boxed{\uparrow}$ $\boxed{2ND}$ $\boxed{\text{ENTER}}$

Method 1.1.2.

i. *Backspace button*: $\boxed{\rightarrow}$, i.e., pressing $\boxed{2}$ $\boxed{\times}$ $\boxed{3}$ $\boxed{\rightarrow}$ $\boxed{2}$ $\boxed{=}$ will give 4.

ii. *Clear previous entry*: $\boxed{CE|C}$

iii. *Clear everything*: $\boxed{CE|C}$ $\boxed{CE|C}$

iv. *Clear TVM worksheet*: $\boxed{2ND}$ $\boxed{FV}$ (CLR TVR)

Method 1.1.3.

i. *Store in memory*: $\boxed{STO}$ ($\boxed{0}$ to $\boxed{9}$)

ii. *Recall from memory*: $\boxed{RCL}$ ($\boxed{0}$ to $\boxed{9}$)

iii. *Recall last answer*: $\boxed{2ND}$ $\boxed{=}$

iv. *Clear all memory and store values*: $\boxed{2ND}$ $\boxed{0}$ $\boxed{2ND}$ $\boxed{CE|C}$

Method 1.1.4.

i. *Set up calculator for single variable statistics*: $\boxed{2ND}$ $\boxed{8}$, then $\boxed{2ND}$ $\boxed{\text{ENTER}}$ until we see 1-V on screen. Then clear contents $\boxed{CE|C}$.
Enter data setting and clear the data: $\boxed{2ND}$ $\boxed{7}$ $\boxed{2ND}$ $\boxed{CE|C}$.
Enter single-var data: [VALUE] $\boxed{\text{ENTER}}$ $\boxed{\downarrow}$ $\boxed{\downarrow}$, enter value in X (data), and leave Y as 1 (frequency).
Enter stats function and toggle $\boxed{\downarrow}$ to see mean, sample s.d., population s.d.
For weighted returns, use X as the return, and Y as the weights.

ii. *Covariance and correlation*: $\boxed{2ND}$ $\boxed{8}$, then $\boxed{2ND}$ $\boxed{\text{ENTER}}$ until we see [LIN] on screen. Then clear contents $\boxed{CE|C}$.
Enter data setting and clear the data: $\boxed{2ND}$ $\boxed{7}$ $\boxed{2ND}$ $\boxed{CE|C}$.
Enter data: [VALUE] $\boxed{\text{ENTER}}$ $\boxed{\downarrow}$ $\boxed{\downarrow}$, enter value in X and Y.
Enter stats function and toggle $\boxed{\downarrow}$ to see r, Sx and Sy, then compute covariance as $Sx \times S_y$.
Correlation is simply the value r computed earlier.

iii. *Time value of money*: Input values into all except one of these: $\boxed{\text{N}}$ $\boxed{I/Y}$ (%), $\boxed{\text{PV}}$, $\boxed{\text{PMT}}$, $\boxed{\text{FV}}$. Then use $\boxed{\text{CPT}}$ on the target variable to solve for the results.

iv. *Interest rate conversion*, i.e., convert nominal 10%, $m = 12$ payments per year into effective rate.
$\boxed{2ND}$ $\boxed{2}$ (ICONV) $\boxed{\uparrow}$ $\boxed{12}$ $\boxed{\text{ENTER}}$, $\boxed{\downarrow}$ $\boxed{10}$ $\boxed{\text{ENTER}}$, $\boxed{\downarrow}$ $\boxed{\text{CPT}}$ to get effective rate.

v. *Cash flow computation*: clear memory with [CF] [$2ND$] [$CE|C$], then input [VALUE] [ENTER] [$\downarrow$].
Enter interest rate with [NPV] [VALUE] [ENTER] [$\downarrow$], then [CPT] to get present value, PV.

vi. *Amortisation schedule*: i.e., \$1000 on 3-year loan, interest rate of 10%.
Check payment per year, make sure it is 1 (with [$2ND$] [I/Y]).
Input information with [3] [N] [10] [I/Y] [1000] [PV] [CPT] [PMT].
Before using amortisation worksheet, clear memory with [$2ND$] [PV] (AMORT) [$2ND$] [$CE|C$].
To see interest and principal repayment at each time period, set $P1$ as [t] for year t, then use [CPT] [$\downarrow$] to see the values at each time period.

1.2 Memorise for Exams

Definition 1.2.1. *Critical Z-values*

One-Tailed Test	Two-Tailed Test
–	68% (1.0)
–	90% (1.645)
95% (1.645)	95% (1.96)
97.5% (1.96)	–
99% (2.33)	99% (2.58)
99.5% (2.57)	–

2 Quantitative

2.1 Time Value of Money

Definition 2.1.1. *Expected Annual Rate*

$$\text{EAR} = (1 + \text{periodic rate})^m - 1$$
$$\text{EAR} = e^r - 1$$

Definition 2.1.2. *Continuous Compounding*

$$FV_N = PVe^{r_s N}$$

Definition 2.1.3. *Ordinary Annuity*: first cash flow one period from now.

$$FV_N = A\left[\frac{(1+r)^N - 1}{r}\right]$$

Definition 2.1.4. *Annuity Due*: first cash flow occurs from today.

$$FV_N = A\left[\frac{(1+r)^N - 1}{r}\right](1+r)$$

Definition 2.1.5. *Perpetuity*: never ending cash flows.

$$PV = \frac{A}{r}$$

2.2 Statistics

Definition 2.2.1. *Harmonic Mean*

$$\overline{X}_H = \frac{n}{\sum_{i=1}^{n} \frac{1}{X_i}}$$

Definition 2.2.2. *Mean Absolute Deviation*

$$\text{MAD} = \frac{\sum_{i=1}^{n} |X_i - \overline{X}|}{n}$$

Definition 2.2.3. *Semi-variance*: average squared deviation below mean

$$s^2 = \frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1} \quad \forall X_i \leq \overline{X}$$

Definition 2.2.4. *Chebyshev Inequality*: proportion of observations within k standard deviation of arithmetic mean is at least $1 - \frac{1}{k^2}$

$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}$$

Definition 2.2.5. *Coefficient of Variance* (CV): the lower the CV value the better; less risk per unit return.

$$CV = \frac{s}{\overline{X}}$$

Definition 2.2.6. *Skewness*:

i. Symmetric: mean = median = mode
ii. Positive skew: mode < median < mean
iii. Negative skew: mean < median < mode

Positive skewness is preferred.

Definition 2.2.7. *Excess Kurtosis*: characterises kurtosis relative to the normal distribution.

i. Normal, mesokurtic distribution: excess kurtosis = 0
ii. Leptokurtic distribution: excess kurtosis > 0
iii. Platykurtic distribution: excess kurtosis < 0

Definition 2.2.8. *Odds*:

i. Odds for event $E = \frac{P(E)}{1-P(E)}$
ii. Odds against event $E = \frac{1-P(E)}{P(E)}$

Definition 2.2.9.

i. Expected value: $E(X) = \sum_{i=1}^{n} P(X_i)X_i$
ii. Variance: $\sigma^2(X) = E[(X - E[X])^2] = \sum_{i=1}^{n} P(X_i)[X_i - E[X_i]]^2$
iii. Covariance: $\text{Cov}(R_i, R_j) = E[(R_i - E[R_i])(R_j - E[R_j])]$
iv. Correlation: $\rho(R_i, R_j) = \frac{\text{Cov}(R_i, R_j)}{\sigma(R_i)\sigma(R_j)}$

Definition 2.2.10.

i. Portfolio variance: $\sigma^2(X) = E[(R_p - E[R_p])^2] = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \text{Cov}(R_i, R_j)$
ii. Joint distribution function: $\text{Cov}(R_A, R_B) = \sum_i \sum_j P(R_{A,i}, R_{B,j})(R_{A,i} - E[R_A])(R_{B_i} - E[R_B])$.
Sum all possible standard deviation cross-products, weighted by the appropriate joint probability.

Definition 2.2.11.

i. Labelling: of N objects with k different labels. Total combinations $= \frac{n!}{n_1!n_2!...n_k!}$

ii. Combination: $nCr = \frac{n!}{(n-r)!r!}$

iii. Permutations: $nPr = \frac{n!}{(n-r)!}$

Definition 2.2.12. *Measurement scales*

i. Nominal: categorises data, but do not have rank

ii. Ordinal: data is sorted $(<, >)$

iii. Interval: differences are meaningful $(<, >, +, -)$

iv. Ratio: true zero is origin $(<, >, +, -, 0)$

Definition 2.2.13.

i. Monte Carlo Simulation: provides distribution of possible solutions to complex functions

ii. Scenario analysis: shows changes in key financial quantities that result from given economic events

iii. Historical simulation: approach in back-testing data

Definition 2.2.14.

i. Empirical probability: estimated from data as relative frequency of occurrence

ii. Subjective probability: drawn on personal or subjective judgment

iii. Priori probability: Obtained based on logical analysis

Definition 2.2.15. *Probability Distributions*

Distribution	Notation	PMF or PDF	Mean	Variance
Binomial	$X \sim B(n,p)$	$P(X=x) = \binom{n}{x}p^x(1-p)^{n-x}$	np	$np(1-p)$
Normal	$X \sim N(\mu,\sigma^2)$	$f(x) = \frac{1}{\sigma\sqrt{2\pi}}\exp(-\frac{1}{2}(\frac{x-\mu}{\sigma})^2)$	μ	σ^2
Standard Normal	$X \sim N(0,1)$	Standardised with $Z = \frac{X-\mu}{\sigma}$	0	1
Log-Normal	$X \sim \text{Lgn}(\mu,\sigma^2)$	$\frac{1}{x\sigma\sqrt{2\pi}}\exp\left(-\frac{(\ln x-\mu)^2}{2\sigma^2}\right)$	$\exp(\mu+\frac{\sigma^2}{2})$	$[\exp(\sigma^2)-1]\exp(2\mu+\sigma^2)$
Student's t	$X \sim t_v$	–	0	$\frac{v}{v-2}$ for $v>2$, $v=n-1$

Definition 2.2.16. *Central Limit Theorem*
For any distribution, mean $\overline{X}$ approaches a normal distribution with mean μ and variance $\frac{\sigma^2}{N}$ as $N \to \infty$.

Definition 2.2.17. *Confidence Interval*

$$\text{Point Estimate} \pm \text{Reliability Factor} \times \text{Standard Error}$$

Definition 2.2.18. *Biases*:

i. Data Mining: Continually mixing and matching factors until two or more data series that are highly correlated are discovered.

ii. Sample Selection: Data availability leads to certain assets being excluded from analysis, i.e. non-response

iii. Survivorship: Studies on databases that have eliminated all companies that have ceased to exist.

iv. Look-ahead: Studies assume that fundamental info is available when it is not. Bias results up.

v. Time Period: Test design is based on a time period that may make results time-period specific.

vi. Data Snooping: Bias in inference drawn due to prying into empirical results of others to guide own analysis

2.3 Hypothesis Testing

Definition 2.3.1. *One-tailed and Two-tailed Tests of Single Mean*

i. Two-tailed test $H_0 : \theta = \theta_0$ against $H_\alpha : \theta \neq \theta_0$.
Reject H_0 if test statistic $z < -z_{\alpha/2}$ or $z > z_{\alpha/2}$.

ii. Right-tailed test $H_0 : \theta \leq \theta_0$ against $H_\alpha : \theta > \theta_0$.
Reject H_0 if test statistic $z > z_\alpha$.

iii. Left-tailed test $H_0 : \theta \geq \theta_0$ against $H_\alpha : \theta < \theta_0$.
Reject H_0 if test statistic $z < -z_\alpha$.

Definition 2.3.2. The *test statistic* is as follows:

$$\text{Test statistic} = \frac{\text{Sample statistic} - \text{Value of population parameter under } H_0}{\text{Standard error of sample statistic}}$$

Definition 2.3.3. *Type I and Type II Errors*

Decision	H_0 True	H_0 False
Do not reject H_0	Correct Decision	Type II Error
Reject H_0	Type I Error	Correct Decision

Definition 2.3.4.

i. *Significance Level*: probability of incorrectly rejecting the null hypothesis.

ii. *Power of Test*: Probability of correctly rejecting the null hypothesis (not committing a Type II error).

iii. *P-Value*: Smallest level of significance at which the null hypothesis can be rejected.

Definition 2.3.5. *One-tailed and Two-tailed Tests of Two Mean*

i. Two-tailed test $H_0 : \mu_1 - \mu_2 = 0$ against $H_\alpha : \mu_1 - \mu_2 \neq 0$.
Reject H_0 if test statistic $t > t_{\alpha/2}$ or if $t < t_{1-\alpha/2}$, with $df = v$.

ii. Right-tailed test $H_0 : \mu_1 - \mu_2 \leq 0$ against $H_\alpha : \mu_1 - \mu_2 > 0$.
Reject H_0 if test statistic $t > t_{1-\alpha}$, with $df = v$.

iii. Left-tailed test $H_0 : \mu_1 - \mu_2 \geq 0$ against $H_\alpha : \mu_1 - \mu_2 < 0$.
Reject H_0 if test statistic $t < t_\alpha$, with $df = v$.

Definition 2.3.6. *One-tailed and Two-tailed Tests of Single Variance*

i. Two-tailed test $H_0 : \sigma^2 = \sigma_0^2$ against $H_\alpha : \sigma^2 \neq \sigma_0^2$.
Reject H_0 if test statistic $> \chi^2_{\alpha/2}$ or if test statistic $< \chi^2_{1-\alpha/2}$, with $df = n - 1$.

ii. Right-tailed test $H_0 : \sigma^2 \leq \sigma_0^2$ against $H_\alpha : \sigma^2 > \sigma_0^2$.
Reject H_0 if test statistic $> \chi^2_\alpha$, with $df = n - 1$.

iii. Left-tailed test $H_0 : \sigma^2 \geq \sigma_0^2$ against $H_\alpha : \sigma^2 < \sigma_0^2$.
Reject H_0 if test statistic $< \chi^2_{1-\alpha}$, with $df = n - 1$.

Definition 2.3.7. *One-tailed and Two-tailed Tests of Two Variances*

i. Two-tailed test $H_0 : \sigma_1^2 = \sigma_2^2$ against $H_\alpha : \sigma_1^2 \neq \sigma_2^2$.
Reject H_0 if test statistic $> F_{\alpha/2}$.

ii. Right-tailed test $H_0 : \sigma_1^2 \leq \sigma_2^2$ against $H_\alpha : \sigma_1^2 > \sigma_2^2$.
Reject H_0 if test statistic $> F_\alpha$.

iii. Left-tailed test $H_0 : \sigma_1^2 \geq \sigma_2^2$ against $H_\alpha : \sigma_1^2 < \sigma_2^2$.
Reject H_0 if test statistic $< F_{1-\alpha}$.

Method 2.3.8. *Statistical Test Summaries*

i. *Test of Single Mean*

Sample	Variance	Small Sample	Large Sample
Normal	Known	$z = \frac{\overline{X}-\mu_0}{\sigma/\sqrt{n}}$	$z = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$
Normal	Unknown	$t_{n-1} = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$	$t_{n-1} = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$ or $z = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$
Non-normal	Known	Not Available	$z = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$
Non-normal	Unknown	Not Available	$t_{n-1} = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$ or $z = \frac{\overline{X}-\mu_0}{s/\sqrt{n}}$

ii. *Test of Two Mean*

Sample	Variance	Test Statistics	Degrees of Freedom
Normal	Equal, Unknown	$t = \frac{(\overline{X}_1 - \overline{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}}$, where $s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}$ is pooled estimator of common variance	$df = n_1 + n_2 - 2$
Normal	Unequal, Unknown	$t = \frac{(\overline{X}_1 - \overline{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	$df = \frac{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}{\frac{(s_1^2/n_1)^2}{n_1} + \frac{(s_2^2/n_2)^2}{n_2}}$
Normal	Paired, Unknown	$t = \frac{\overline{d} - \mu_{d0}}{s_{\overline{d}}}$, where $\overline{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$, $s_{\overline{d}} = \frac{1}{\sqrt{n}}\frac{\sum_{i=1}^{n}(d_i - \overline{d})^2}{n-1}$	$df = n - 1$

iii. *Correlation Test*: Assess correlation strength of two variables, $H_0 : \rho = 0$ against $H_1 : \rho \neq 0$.
Test statistic is $t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$, where r is the sample correlation.
Degrees of freedom is $df = n - 2$.

iv. *Test of Single Variance Equality*: compare variance of population σ^2 against hypothesised value σ_0^2.
Test statistic is $\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$, where sample variance is $s^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}$.
Degrees of freedom is $df = n - 1$.

v. *Test of Two Variance Equality*: for two populations with normal distribution.
Test statistic is $F = \frac{s_1^2}{s_2^2}$.
Degrees of freedom for numerator is $df_1 = n_1 - 1$, for denominator is $df_2 = n_2 - 1$.

vi. *Spearman Rank Test*: If the assumption that two variables are uncorrelated is not valid, use the test.

1. Rank observations on X from large to small. For ties, assign average of ranks. Do same for Y.
2. Calculate difference d_p, between the ranks of each pair of observations on X and Y.
3. With sample size n, test statistic is $r_s = 1 - \frac{\sum_{i=1}^{n} d_i^2}{n(n^2-1)}$.
   If $n > 30$, use t-test instead, where $t = \frac{(n-2)^{1/2} r_s}{(1-r_s^2)^{1/2}}$ with degrees of freedom $df = n - 2$.

vii. *Parametric vs Non-Parametric Tests*

	Parametric	Non-Parametric
Tests on single mean	t-test, z-test	Wilcoxon signed-rank test
Tests on differences between means	t-test, approx t-test	Mann-Whitney U test
Tests on mean differences (paired)	t-test	Wilcoxon signed-rank test, sign test

2.4 Regression

Definition 2.4.1. *Linear Regression Assumptions*

i. Linearity: $Y \sim a_i X_i$, where a_i is a constant, Y is dependent variable, X_i is independent variable.
ii. Homoscedasticity: Variance of residual $Var(Y - \hat{Y})$ is constant $\forall$ observations (Y is actual, $\hat{Y}$ is predicted).
iii. Independence: Residuals are uncorrelated across observations, $E[\epsilon_i \epsilon_j] = 0 \ \forall i \neq j$.
iv. Normality: Residual term is normally distributed.
v. Expected value of residual term is zero, $E[\epsilon] = 0$.
vi. Independent variable is uncorrelated with the residuals.

Definition 2.4.2. *Regression Performance Plots*:

i. Scatterplot (variable vs variable): for possible correlation between independent variables, identify outliers.
ii. Scatterplot (residual vs predicted): for possible correlation between residual and predict value.
iii. Normal Q-Q plot (theory vs empirical distribution): residual vs normal distribution. If residuals are along the diagonal, then it is good.

Definition 2.4.3. The estimated *slope coefficient* $\hat{b}_1$ is computed as $\hat{b}_1 = \frac{Cov(X,Y)}{\sigma_X^2}$.

Definition 2.4.4. The *standard error (SE)* is defined as $SE = \frac{\sigma}{\sqrt{n}}$.

Definition 2.4.5. The *regression coefficient confidence interval* is defined as $\hat{b}_1 \pm (t_\alpha + SE_{\hat{b}_1})$, where t_α is the critical two-tailed t-value for the confidence level α, with degrees of freedom $df = n - 2$.

Definition 2.4.6. *Test of Slope Coefficient Significance*
Two-tailed test $H_0 : b_1 = 0$ against $H_\alpha : b_1 \neq 0$.
Test statistic is $t = \frac{\hat{b}_1 - b_1}{SE_{\hat{b}_1}}$, with degrees of freedom $df = n - 2$.
Reject H_0 if $t > t_{\alpha/2}$ or $t < -t_{\alpha/2}$.

		Test of the Slope	Test of the Correlation
Step 1	State the hypotheses.	H_0: $b_1 \leq 0$ versus H_a: $b_1 > 0$	H_0: $\rho \leq 0$ versus H_a: $\rho > 0$
Step 2	Identify the appropriate test statistic.	$t = \frac{\hat{b}_1 - B_1}{s_{\hat{b}_1}}$ with 6 – 2 = 4 degrees of freedom.	$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$. with 6 – 2 = 4 degrees of freedom.
Step 3	Specify the level of significance.	α = 5%.	α = 5%.
Step 4	State the decision rule.	Critical t-value = 2.132. Reject the null if the calculated t-statistic is greater than 2.132.	Critical t-value = 2.132. Reject the null if the calculated t-statistic is greater than 2.132.
Step 5	Calculate the test statistic.	$t = \frac{1.25 - 0}{0.312398} = 4.00131$	$t = \frac{0.8945\sqrt{4}}{\sqrt{1-0.8001}} = 4.00131$
Step 6	Make a decision.	Reject the null hypothesis. There is sufficient evidence to indicate that the slope is greater than zero.	Reject the null hypothesis. There is sufficient evidence to indicate that the correlation is greater than zero.

Figure 1: One-sided tests for slop and correlation, single regression

Definition 2.4.7. The *predicted values confidence interval* is defined as $\hat{Y} \pm (t_{\alpha/2} \times SE_f)$, where $t_{\alpha/2}$ is the critical two-tailed t-value for the confidence level α, with degrees of freedom $df = n-2$, and SE_f is the standard error of the forecast. Note that $SE_f^2 = SEE^2 \left[1 + \frac{1}{n} + \frac{(X-\overline{X})^2}{(n-1)\sigma_X^2}\right]$, where σ_X^2 is the variance of the independent variable, X is the value of the independent variable for which the forecast was made.

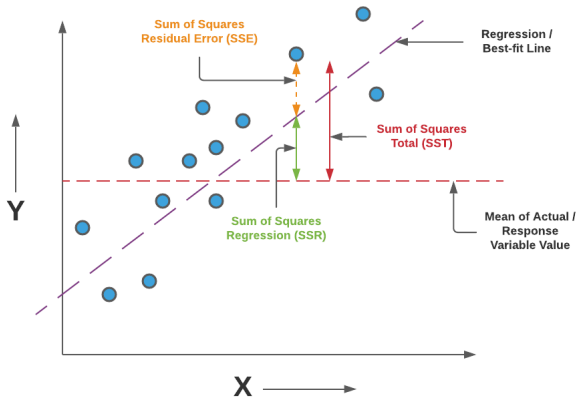

Figure 2: Regression Error Terms

Definition 2.4.8. *Error Terminology*

i. Sum of total squares (SST): measures total variation in dependent variable. Sum of squared differences between actual and mean value, $SST = \sum_{i=1}^{n}(Y_i - \overline{Y})^2$.

ii. Sum of squares regression (SSR): measures variation in dependent variable as explained by independent variable. Sum of square distances between predicted and mean value, $SSR = \sum_{i=1}^{n}(\hat{Y}_i - \overline{Y})^2$.

iii. Sum of squares residual error (SSE): measures unexplained variation in dependent variable. Sum of squared vertical distance between actual and predicted values. $SSE = \sum_{i=1}^{n}(Y_i - \hat{Y})^2$.

iv. Mean squares regression (MSR): $MSR = \frac{SSR}{k}$, where k is number of independent variables.

v. Mean squares error (MSE): $MSE = \frac{SSE}{n-k-1}$, where k is number of independent variables.

vi. Standard error of estimate (SEE): $SEE = \sqrt{\frac{\sum_{i=1}^{n}(Y_i - \hat{Y})}{n-2}} = \sqrt{MSE}$.

vii. Standard error of intercept: $SE_{\hat{b}_0} = \sqrt{\frac{1}{n} + \frac{\overline{X}^2}{\sum_{i=1}^{n}(X_i - \overline{X})^2}}$

Definition 2.4.9. *Test of Slope Intercept Significance*
Two-tailed test $H_0 : b_0 \leq B_0$ against $H_\alpha : b_0 > B_0$.
Test statistic is $t = \frac{\hat{b}_0 - B_0}{SE_{\hat{b}_0}}$, with degrees of freedom $df = n - 2$.
Reject H_0 if $t > t_\alpha$.

Step 1	State the hypotheses.	H_0: $b_0 \leq 3\%$ versus H_a: $b_0 > 3\%$
Step 2	Identify the appropriate test statistic.	$t_{intercept} = \frac{\hat{b}_0 - B_0}{s_{\hat{b}_0}}$ with 6 – 2 = 4 degrees of freedom.
Step 3	Specify the level of significance.	$\alpha = 5\%$.
Step 4	State the decision rule.	Critical t-value = 2.132. Reject the null if the calculated t-statistic is greater than 2.132.
Step 5	Calculate the test statistic.	$t_{intercept} = \frac{4.875 - 3.0}{\sqrt{\frac{1}{6} + \frac{6.1^2}{122.64}}} = \frac{1.875}{0.68562} = 2.73475$
Step 6	Make a decision.	Reject the null hypothesis. There is sufficient evidence to indicate that the intercept is greater than 3%.

Figure 3: Slope intercept test of regression

Definition 2.4.10. *Coefficient of determination, R^2*, measure goodness of fit of regression to data.

$$R^2 = \frac{SST - SSE}{SST} = \frac{SSR}{SST}$$

Note that R^2 do not allow us to know if coefficients are statistically significant. There is no info on bias in estimated coefficients and predicted values. There is no info if model fit is good as well.

Definition 2.4.11. *Adjusted R^2*, adjusts for degrees of freedom.

$$\overline{R}^2 = 1 - \left[\left(\frac{n-1}{n-k-1}(1-R^2)\right)\right]$$

where k is number of independent variables.

If we are adding new independent variable to the regression, if the coefficient t-statistics $> |1.0|$, then $\overline{R}^2$ will increase. If coefficient t-statistics $< |1.0|$, then $\overline{R}^2$ will decrease.

Definition 2.4.12. *Information Criterions*

i. *Akaike Information Criterion (AIC)*: evaluate model parsimony. Lower AIC means better fitting.

$$AIC = n\ln(\frac{SSE}{n}) + 2(k+1)$$

where n is the sample size, k is number of independent variables.

ii. *Bayesian Information Criterion (BIC)*: gives greater penalty than AIC if model has more parameters. Lower BIC means better fitting.

$$BIC = n\ln(\frac{SSE}{n}) + \ln(n)(k+1)$$

AIC is preferred if model is used for prediction. BIC is preferred if best goodness of fit is desired.

Definition 2.4.13. *Analysis of Variance (ANOVA)* analyses the total variability of the dependent variable:

3 Economics

3.1 Currency Exchange Rates

4 Financial Statement Analysis

4.1 Financial Reporting

Remark 4.1.1. Role of Financial Statement Analysis

i. Role of financial reporting: provide information about company's financial position for use by internal and external parties.

ii. Role of financial analysis: evaluate company past, current, prospective financial position and performance for investment, credit, and similar decisions

Definition 4.1.2. *Financial Statements*

i. Balance sheet (BS): provides information on liquidity, solvency, financial position at a point of time.

$$\text{Assets} = \text{Liabilities} + \text{Owner's Equity}$$

ii. Income statement (IS): provides information on financial performance of activities over period of time on a consolidated basis

iii. Cash Flow Statement (CFS): discloses sources and use of cash. For liquidity, solvency, financial flexibility

iv. Statement of changes in equity: shows changes in owner's investment in the business over time, in order of liquidation and dividends

v. Financial footnotes: includes accounting methods (assumptions and estimates), and disclosure on fixed assets, inventory methods, income taxes, pensions, debt, contingencies etc.

vi. Supplementary schedules: includes additional info on assets and liabilities of company, but is unaudited

vii. Management commentary: includes specific issues on financial statements, current financial condition, liquidity, and planned capital expenditure (Capex). Not audited, for public companies only.

Remark 4.1.3. *Auditor Reports.* In accordance with GAAP, identify inconsistent principles.

i. Unqualified opinion: free of material misstatements (by GAAP). Fairly represented.

ii. Qualified opinion: 1 to 2 situations not compliant with GAAP, rest are fairly presented.

iii. Adverse opinion: materially misstated, generally do not comply with GAAP. Unreliable, inaccurate.

iv. Disclaimer of opinion: auditor could not form and refuses to present an opinion. Issued when auditor cannot complete work.

Remark 4.1.4. *Standard Setting Bodies.* These are private sector, self-regulated bodies.

i. IASB: Standard-setting body of IFRS Foundation. Deliberate, develop, issue international financial reporting standards.

ii. FASB: Issues new and revised standards to develop standards of financial reporting. US GAAP recognised by SEC, but SEC retains authority to establish standards.

Principles: To provide full, accurate, and timely disclosure of financial results, risks, and other information material to investor's decisions. High and internationally acceptable quality.

Remark 4.1.5. *Regulatory Bodies.* These have the legal authority to enforce financial reporting requirements, can overrule private-sector standard setting bodies.

i. IOSCO: Regulate world financial markets. Protect investors, ensure markets are fair, efficient, and transparent, and reduce systematic risk.

ii. SEC: Governs form and content of financial statements through securities act. Oversees PCAOB.

Remark 4.1.6. *Key Regulations*

i. Securities exchange act of 1934: Created SEC, give SEC authority over all aspects of securities industry, empower SEC to require periodic reporting.

ii. Securities act of 1993: Specified financial and other significant information that investors must receive when securities are sold, prohibits misrepresentations, requires initial registration of all public issuances of securities.

iii. Sarbanes-Oxley Act of 2002: Oversee auditors. Ensure auditor independence, corporate responsibility for financial reports, effectiveness of firm's internal control over financial reporting.

Financial Statement Analysis Process:

Step	Step Name	Input	Output
1	Articulate the purpose and context of the analysis	• The nature of the analyst's function and context of the analysis such as evaluating an equity or debt investment or issuing a credit rating. • Communication with client or supervisor on needs and concerns. • Institutional guidelines related to developing specific work product.	• Statement of the purpose or objective of the analysis. • A list (written or unwritten) of specific questions to be answered by the analysis. • Nature and content of the report to be provided. • Timetable and budgeted resources for completion.
2	Collect input data	• Financial statements, other financial data, questionnaires, and industry, economic data. • Discussions with management, suppliers, customers, and competitors. • Company site visits (e.g., to production facilities or retail stores).	• Organised financial statements. • Financial data tables. • Completed questionnaires, if applicable.
3	Process data	• Data from previous phase.	• Adjusted financial statements. • Common-size statements. • Ratios and graphs. • Forecasts
4	Analyse and interpret the processed data	• Input data as well as processed data.	• Analytical results.
5	Develop and communicate conclusions and recommendations (e.g., with an analysis report).	• Analytical results and previous reports. • Institutional guidelines for published reports.	• Analytical report answering questions posed in Phase 1. • Recommendation regarding the purpose of the analysis, such as whether to make an investment or grant credit.
6	Follow up	• Information gathered by periodically repeating above steps as necessary to determine whether changes to holdings or recommendations are necessary.	• Updated reports and recommendations.

Remark 4.1.7. *Types of Reports*

i. Registration statement: provides disclosure about securities offered for sale; relationship of new securities to other securities; informational provided in annual filings; recent audited financial statement; risk factors in the business.

ii. Forms 10-K, 20-F, 40-F: Forms 10-K are for US registrants, 40-F are for Canadian, and 20-F for other non-US registrations. This is a legal document with minimal marketing. Provides information on business, financial disclosures, legal proceedings, information related to management.

iii. Annual report: Not SEC requirement. Opportunity for company to present itself to stakeholders and other external parties. Highly polished marketing document. Overlap with 10-K.

iv. Proxy statements, Form DEF-14A: Provides information on litigation, executive compensation, related-party transactions. Proposals that require shareholder vote, security ownership by management and principal owners, director's biographic information.

v. Interim reports, Forms 10-Q, 6-K: Provided on a quarterly basis, less detailed than annual reports, unaudited statements and footnotes. If no-recurring events take place, included in 10-Q report.

vi. Forms 8-K: Announce major events such as acquisitions, disposal of corporate assets, changes in securities and trading markets, matters related to accountants and financial statements, corporate governance and management changes, regulation FD disclosures.

vii. Forms 3, 4, 5: Report beneficial ownership of securities for any owners greater than 10% per class of securities. Form 3 is initial statement, Form 4 is changes, Form 5 is annual report.

viii. Form 155: Notice of proposed sale of restricted securities or securities held by affiliate of the issuer.

ix. Form 11-K: Annual report of employee stock purchase, savings, etc.

Definition 4.1.8. *Financial Reporting Recognition Principles*

i. *Probable*: economic outcome has high probability of occurrence.

ii. *Measurable*: economic outcome measured exactly with reliability.

Definition 4.1.9. *Financial Reporting Fundamental Qualitative Factors*

i. *Relevance*: potential to affect or make difference in user's decisions. Predictive, confirmatory value.

ii. *Materiality*: omission or misstatement can influence user decisions

iii. *Faithful Representation*: complete, neutral, free from error

Definition 4.1.10. *Financial Reporting Enhancing Qualitative Factors*
Comparable and consistent, verifiable, timeliness, and understandable.

As it takes time to get reliable information, will need to get balance between relevance and reliability.

Definition 4.1.11. *Accounting Assumptions*: on an accrual basis, going concern principle.

Definition 4.1.12. *Types of Costs*

i. *Historical Cost*: recorded at value paid at time of acquisition for assets, and liabilities proceeds in return for obligation.

ii. *Amortised Cost*: historical cost adjusted for amortisation, depreciation, or depletion/impairment.

iii. *Current Cost*: cash or cash equivalents if asset is paid for or liability required to settle obligation currently.

Definition 4.1.13. *Types of Value*

i. *Realisable Value*: cash or cash equivalents if assets sold in an orderly disposal, and liability at settlement.

ii. *Present Value*: assets at present value (PV) discounted of future cash flows. Liabilities at PV discounted of future net cash flows required to settle.

iii. *Fair Value*: amount which an asset could be exchanged, or liability settled between willing parties.

Remark 4.1.14. *IFRS Reporting Requirements*

i. Required financial statements: balance sheet, income statement, statement of changes in equity, cash flow statement, notes.

ii. Required features: fair representation, going concern, accrual basis, consistency, materiality and aggregation, no offsetting. Annual frequency of reporting. Comparative information from previous periods.

iii. Structure and Content:

   1. Balance Sheet: disclose current and non-current assets and liabilities, unless if liquidity-based presentation is more reliable and relevant.
   2. Financial Statements: minimum line-item disclosures.
   3. Notes: disclosures on information.
   4. Comparative information: disclosed for previous period.

iv. Disclosure of accounting policies:

   1. Measurement bases used in preparing financial statements
   2. Significant accounting policies used
   3. Judgments made in applying accounting policies that have the most significant effect on the amounts recognised in the financial statements

v. Sources of estimation uncertainty: Key assumptions about the future and other key sources of estimation uncertainty that have a significant risk of causing material adjustment to the carrying amount of assets and liabilities within the next year

vi. Other Disclosures:

   1. Information about capital and about certain financial instruments classified as equity
   2. Dividends not recognised as a distribution during the period, including dividends declared before the financial statements were issued and any cumulative preference dividends
   3. Description of the entity, including its domicile, legal form, country of incorporation, and registered office or business address

4. Nature of operations and principal activities
5. Name of parent and ultimate parent

Effective financial reporting have the following characteristics: transparency, comprehensiveness, consistency

Remark 4.1.15. *Barriers to a single standard*:

i. Valuation approach: judgement is required
ii. Standard-setting approach: principles-based vs rule-based
iii. Measurement approach: what constitutes an asset and a liability. Use of matching principle

If new products are launched by a business, understand the business purposes, then evaluate potential effect on financial statements.

4.2 Basic Financial Statement Analysis

4.2.1 Income Statement Analysis

Remark 4.2.1. *Revenue Recognition*
Revenue is recognised even if cash is not collected until next accounting period.

Definition 4.2.2. *Common Income Statement Line Items*

i. Net Sales:
$$\text{Net Sales} = \text{Gross Sales} - \text{Sales returns and allowances} - \text{discounts}$$

ii. Gross Margin:
$$\text{Gross Margin} = \text{Net Sales} - \text{Cost of Goods Sold}$$

iii. Operating Expenses: expenses other than cost of goods sold (COGS), i.e. selling expenses, general and administrative expenses

iv. Operating Income:
$$\text{Operating Income} = \text{Gross Margin} - \text{Operating Expenses}$$

v. Earnings Before Interest and Taxes (EBIT): amount earned from all activities before income taxes.

vi. Net Income: gross margin.
$$\text{Net Income} = \text{EBIT} - \text{Income Tax}$$

Method 4.2.3. *B.A.S.E. Technique*

B: Beginning balance

A: Add cash payments and liability account ending balances

S: subtract asset accounting ending balances

E: equals ending balance

Definition 4.2.4. *Accrual Accounting*
Revenue is recognised when earned.
If revenue is on credit, it is on trade and accounts receivable account.
If revenue is earned in advance, there is liability account for unearned revenue.

Method 4.2.5. *Revenue Recognition*

1. Identify the contract with a customer
2. Identify distinct performance obligations in the contract
3. Determine contract transaction price
4. Allocate transaction price to obligations
5. Recognize revenue when obligation is satisfied.

Remark 4.2.6. *Revenue Recognition Conditions*

i. Completion of earnings process (no obligation for future services, i.e. warranty protection)

ii. Assurance of payment (quantified amount must be reliable)

Method 4.2.7. *Percentage of Completion Method*
$$\begin{aligned}\text{Percentage completed} &= \frac{\text{Costs incurred to date}}{\text{Most recent estimate of total costs}}\\ \text{Revenue to be recognised to-date} &= \text{Percent completed} \times \text{Estimated total revenue}\\ \text{Current period revenue} &= \text{Revenue to be recognised to-date} - \text{Revenue recognised prior}\end{aligned}$$

Method 4.2.8. *Completed Contract Method*
Used if there is no contract, or estimates are unreliable, or ability to collect revenue is uncertain.

Method 4.2.9. *Instalment Sales Method*
Used if COGS are known, but collectability of sale proceeds cannot be reasonably determined.

$$\text{Gross Profit Rate} = \frac{\text{Sales} - \text{COGS}}{\text{Sales}}$$
$$\text{Realised Gross Profit} = \text{Cash Collection} \times \text{Gross Profit Rate}$$

Method 4.2.10. *Cost Recovery Method*
More conservative than instalment sales. Used if COGS cannot be reasonably determined.
Sales recognised when cash is received but no gross profit is recognised until all of COGS collected. Profit recognised only when cash collections exceed total COGS.

Method 4.2.11. *Barter Transaction Recognition*
Revenue should be reported only if fair value of transaction is determined based on company's historical practice of receiving cash for similar transaction from buyers unrelated to the counterparty for the barter.

Method 4.2.12. *Reseller Revenue Recognition*

i. Gross reporting used if company has general inventory risk, can determine product price, can change supplier, bears credit risk.
ii. Net reporting if company is sales agent.

Definition 4.2.13. *Revenue Matching Principle*

i. Operating expenses only recognised when the work or product makes contribution to revenue.
ii. Expenses are to be grouped by either function or nature.
iii. Current period expenses to appear on Income Statement.
iv. Future period expenses are capitalised. When revenues are recognised, asset is converted to expenses in these periods.

Method 4.2.14. *Direct Write-Off Method*
Uncollectible accounts charged to expense in the period they are determined to be worthless.
Revenue matching principle is not adhered to.

Method 4.2.15. *Allowance Method*
Bad debt expense recorded in same period as sale.
Estimate on percentage-of-sales basis (on IS) or outstanding receivables (on BS) basis.

Method 4.2.16. *Warranty Recognition*
Recognize estimate warranty expense in period of the sale, and update expense indicated by experience over life of warranty.

4.3 Inter-Corporate Investments

	Financial Assets	Associates	Business Combi	Joint Ventures
Influence	Not significant	Significant	Controlling	Shared Control
Interest %	Usually $< 20\%$	Usually 20% to 50%	Usually $> 50\%$ or other indications of control	
Financial Reporting	Classified as • Fair value through profit or loss (FVPL) • Fair value through other comprehensive income (FVOCI) • Amortised Cost	Equity Method	Consolidation	IFRS: Equity Method
IFRS	IFRS 9	IAS 28	IAS 27, IFRS 3, IFRS 10	IFRS 11, IFRS 12, IAS 28
GAAP	FASB ASC Topic 320	FASB ASC Topic 323	FASB ASC Topics 805 and 810	FASB ASC Topic 323

i. IFRS 9 Financial Instruments; IAS 28 Investments in Associates; IAS 27 Separate Financial Statements; IFRS 3 Business Combinations; IFRS 10 Consolidated Financial Statements; IFRS 11 Joint Arrangements; IFRS 12, Disclosure of Interests in Other Entities.

ii. FASB ASC Topic 320 [Investments-Debt and Equity Securities]; FASB ASC Topic 323 [Investments- Equity Method and Joint Ventures]; FASB ASC Topics 805 [Business Combinations] and 810 [Consolidations].

4.3.1 Investment in Financial Assets: IFRS 9

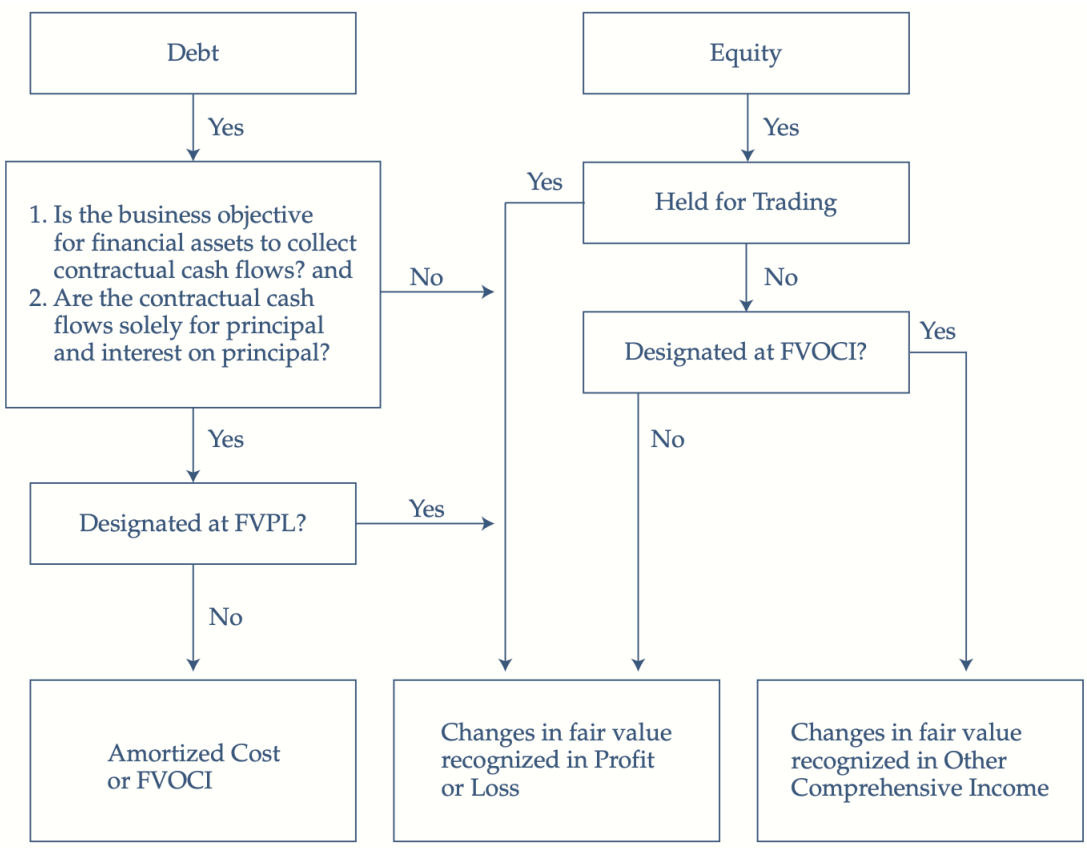

Figure 4: Financial Assets Classification and Measurement Model, IFRS9

Definition 4.3.1. *Investment in Financial Assets: IFRS 9*
IFRS 9 considers contractual characteristics of cash flow and management of financial assets.
For loan impairment, expected credit loss model will be used.

Method 4.3.2. *Amortised Cost Method - Debt Only*
Debt securities meeting following two criteria are accounted for using the amortised cost method:

i. Business Model Test: debt securities are being held to collect contractual cash flows
ii. Cash Flow Characteristics Test: the contractual cash flows are principal, or interest on principal, only.

These are reported on the balance sheet at amortised cost - the original cost of debt plus or minus any discount or premium that has been amortised to date.
Interest income (coupon cash flow adjusted for amortisation of premium or discount) is recognised in income statement; subsequent changes in fair value are ignored.

Method 4.3.3. *Fair Value through Profit or Loss - Debt and Equity*

i. Debt: classified as FVPL if held for trading, or if accounting for these securities at amortised cost results in accounting mismatch (inconsistency from different measurement bases for assets and liabilities)
ii. Equity: classified as FVPL if held for trading. Otherwise, may be classified as either FVPL or FVOCI, choice is irrevocable.
iii. Derivatives: classified as FVPL if not used for hedging. If asset has embedded derivative (i.e., convertible bonds), asset as a whole is valued at FVPL.

Securities are reported on balance sheet at fair value. Changes in fair value (realised and unrealised) are recognised in income statement with any dividend or interest income.

Method 4.3.4. *Fair Value through Other Comprehensive Income - Debt and Equity*
Securities are reported on balance sheet at fair value; any unrealised gain or loss is reported on OCI.
Realised gains or losses, dividends, interest income are reported on the income statement.

	Amortised Cost	FVPL	FVOCI
Balance Sheet	Amortised cost	Fair Value	Fair value, with unrealised gains and losses (GL) recognised in equity
Income Statement	Interest (including amortisation) Realised GL	Interest Dividends Realised GL Unrealised GL	Interest Dividends Realised GL

Method 4.3.5. *Reclassification under IFRS 9*

i. Debt: permitted only if business model has changed such that it significantly affects operations.
ii. Equity: not permitted, as initial designation is irrevocable.

Method 4.3.6. *Loan Impairment under IFRS 9*
Incurred loss model for loan impairment replaced by expected credit loss model. Require companies to evaluate current and historical information on loan performance (loan commitments and lease receivables), and also forward-looking information.
Results in earlier recognition of loan impairment (12 month expected losses for performing loans, lifetime expected losses for non-performing loans).

4.3.2 Investment in Associates: Equity Method

Remark 4.3.7. *Signs of Significant Influence*

i. Investment ownership between 20% and 50%
ii. Representation on board of directors
iii. Participation in the policy-making process
iv. Material transactions between investor and investee
v. Interchange of managerial personnel
vi. Technological dependency

Method 4.3.8. *Equity Method*

i. Initial investment recorded at cost as non-current asset on BS.

ii. Carrying amount of investment adjusted to recognise proportionate share of Profit and Loss (PnL); the PnL are recorded on IS.

iii. Dividends and other distributions from investee is return of capital, reduce carrying amount of investment on BS, but not reported in investor PnL on IS.

iv. On investee loss, investor will receive proportionate share of the loss, reducing the investment account, lower earnings in investor IS.

v. If investment value reduced to zero, equity method is discontinued; further losses will not be recorded. If investee subsequently reports profits, equity method is resumed after investor's share of profit exceed the share of losses not recognised during the suspension period.

Remark 4.3.9. *Fair Value Option*

i. GAAP: allows investments to be recorded at fair value.

ii. IFRS: fair value option only available to VC, mutual funds, unit trusts, ILPs etc.

Decision to use fair value option is irrevocable; any changes in value (with dividends) are recorded in IS.
Investor investment account on BS do not reflect proportionate share of PnL, dividends or other distributions.
Excess of cost over fair value of investee identifiable net assets is not amortised, nor is goodwill created.

Remark 4.3.10. *Excess of Purchase Price over Book Value Acquired*

i. At acquisition, the difference is first allocated to specific assets and liabilities (AnL) of assets using fair values, accounted in manner consistent with accounting treatment for the specific AnL to which it is assigned. Amounts allocated to AnL which are expensed or depreciated to be similarly treated.
Initially the BS records the cost in the investment account.

ii. The difference is then amortised to proportionate share of investee PnL over economic lives of the assets (whose fair value exceeds book value).
On the BS, as the differences are amortised, the balance in investment account will converge to proportionate share of book value of net assets of the associate.
Investor record these adjustments by reducing carrying amount of investment on BS and reducing investee profit recognised on its IS.

iii. The goodwill is reviewed for impairment on regular basis. This is included in carrying amount of the investment on the investor BS.

Method 4.3.11. *Investor Balance Sheet Impact: Equity Method*

$$\text{Purchase Price} - \%\text{ share of net asset BV} = \text{Excess of purchase price}$$
$$\text{Excess of purchase price} - \%\text{ share of (FV} - \text{BV) of PPE} = \text{Goodwill}$$
$$\text{Investor }\%\text{ share of investee net income} - \text{Depreciation of }\%\text{ share of excess PPE} = \text{Equity income}$$
$$\text{Investment balance beginning} + \text{Equity income} - \%\text{ share of dividends} = \text{Investment balance end}$$

Method 4.3.12. *Investor Income Statement Impact: Equity Method*

$$\text{Impact} = \text{Equity income} - \%\text{ share of unrealised profit from downstream and upstream sale}$$

Remark 4.3.13. *Treatment of PPE Depreciation on Investor*

i. IFRS: PPE is to be carried at either historical cost or fair value (less accumulated depreciation)

ii. GAAP: PPE is to be carried at historical cost (less accumulated depreciation) only

Method 4.3.14. *Impairment of Investments*
IFRS and GAAP require periodic reviews for impairment. If fair value of investment is less than carrying value permanently, impairment loss is recognised.

i. IFRS: require objective evidence due to one or more loss events that occur after initial recognition, and the loss event has impact on future CF reliably estimated.
Entire carrying amount tested by comparing recoverable amount with carrying amount.
Impairment loss recognised on IS; carrying amount on BS reduced directly or through allowance account.
Reversal of impairment loss allowed to extent that recoverable amount of net investment increases.

ii. GAAP: treat impairment as permanent.
Impairment loss recognised on IS; carrying value of investment on BS reduced to fair value.
Prohibit reversal of impairment loss even if fair value later increases.

Remark 4.3.15. *Transactions with Associates*
Investor can influence terms and timing of transactions with associates. Profits from such transactions cannot be realised until confirmed through use or sale to third parties.
Investor share of unrealised profit deferred by reducing amount recorded under equity method. When deferred profit is confirmed, added this to equity income based on recorded values in associate's accounts.

i. Upstream (investee to investor): profit recorded on investee IS as PnL. Investor's share of unrealised profit is thus included in equity income on investor IS.
However, for profit that is unconfirmed (goods not been used or sold by investor), investor must eliminate proportionate share of profit from equity income of investee.

ii. Downstream (investor to investee): profit recorded on investor IS. Investor must eliminate proportionate share of profit that is unconfirmed. Adjust equity income on investor's IS by deducting on share percent.

Remark 4.3.16. *Disclosures from Transactions with Associates*
Investee results are included in investor's accounts with time lag (not more than one quarter). Dividends from investee are not included in investor income.
In consolidated BS, book value of shareholdings in investee is increased by investor's share of associate net income, reduced by amortisation of surplus values and amount of dividends received.

Remark 4.3.17. *Analytical Issues of Equity Method*

i. Degree of control of investor on investee may not be proportional to shareholdings.

ii. Significant AnL of investee are not reflected on investor BS, which affect debt ratios. Net margin ratios may be overstated as income for investee is included in investor net income, but not in sales.

When analysing associates, consider quality of equity method earnings, potential restriction on dividend CF.

4.3.3 Business Combinations: Consolidation

Definition 4.3.18. *Types of Business Combinations*

i. *Merger*: Target 100% absorbed. Net assets of Company B transferred to Company B.

$$\text{Company } A + \text{Company } B = \text{Company } A$$

ii. *Acquisition*: Companies connected by parent-subsidiary relationship. May acquire less than 50% and still exert control. May acquire less than 100%, and non-controlling (minority) shareholder interest reported on consolidated financial statements.

$$\text{Company } A + \text{Company } B = (\text{Company } A + \text{Company } B)$$

iii. *Consolidation*: New legal entity formed, take over net assets of both companies.

$$\text{Company } A + \text{Company } B = \text{Company } C$$

IFRS: no distinction made among business combinations.
GAAP: classified as merger, acquisition, or consolidation.

Method 4.3.19. *Pooling-of-Interests Method (IFRS Defunct)*
Ownership interest of two firms combined, participants viewed as equals.

i. Two firms asset and liabilities combined using historical book values

ii. Operating results for prior periods restated as though the two firms were always combined

iii. Ownership interests continue, former accounting bases are maintained

Method 4.3.20. *Acquisition Method: Recognition and Measurement*
Fair value of target includes acquisition-date fair value of any contingent consideration. Direct costs of business combination are expensed. Recognition and measurement of:

i. Identifiable assets and liabilities: measure at fair value at date of acquisition, including intangible assets

ii. Contingent liabilities (CL): measure if it is a present obligation from past events, can be measured reliably.

    1. IFRS: includes CL if fair values can be reliably measured.

2. GAAP: only includes CL that are probable and can be reasonably measured.

iii. Indemnification assets (IA): recognise IA if seller contractually indemnifies acquirer for outcome of a contingency or uncertainty related to all or part of a specific asset or liability of the seller. Seller may also indemnify acquirer against losses above a specified amount on a liability arising from a particular contingency. Acquirer will recognise the IA at the acquisition date fair value.

iv. Financial assets and liabilities: identifiable AnL are classified according to IFRS and GAAP standards. Acquirer reclassifies financial AnL based on contractual terms, economic conditions, acquirer's operation and accounting policies.

v. Goodwill: GAAP requires full goodwill. IFRS prefers partial goodwill; full can be used. IFRS allows recognition on transaction-by-transaction basis.

1. Partial Goodwill: acquisition price less acquirer's share of fair value of all tangible and intangible AnL, CL acquired.

$$\begin{aligned}\text{Partial Goodwill} &= \text{Acquisition Price} - \%\text{ share of fair value of net identifiable assets}\\ \text{Partial Goodwill} &= \text{Acquirer }\%\text{ share of equity} \times \text{Full Goodwill}\\ \text{Non-Controlling Interest} &= \%\text{ share of NCI} \times \text{Acquiree fair value of identifiable net assets}\end{aligned}$$

2. Full Goodwill: fair value of entity less fair value of all tangible and intangible AnL, CL

$$\begin{aligned}\text{Full Goodwill} &= \text{Fair value of combined entity} - \text{fair value of net identifiable assets}\\ \text{Non-Controlling Interest} &= \%\text{ share of NCI} \times \text{Fair value of entity}\end{aligned}$$

vi. Bargain purchase: when acquisition price is less than fair value. Difference to be recognised immediately in PnL on IS. Any contingent consideration is measured and recognised at fair value; subsequent changes in value are recognised in PnL.

Remark 4.3.21. *Full Goodwill vs Partial Goodwill*
Full goodwill results in higher total assets and higher total equity than partial goodwill.
ROA and ROE will be lower if full goodwill method is used.

Method 4.3.22. *Investor Balance Sheet Impact: Acquisition Method*

$$\begin{aligned}\text{End current assets} &= \text{Beginning current assets} + \text{acquiree current assets} - \text{acquisition cash fee}\\ \text{End current liabilities} &= \text{Beginning current liabilities} + \text{acquiree current liabilities}\\ \text{Minority Interest in Equity} &= \%\text{ share of NCI} \times \text{Subsidiary equity}\end{aligned}$$

Method 4.3.23. *Investor Income Statement Impact: Acquisition Method*

$$\begin{aligned}\text{End revenue} &= \text{Beginning revenue} + \text{acquiree revenue}\\ \text{End expenses} &= \text{Beginning expenses} + \text{acquiree expenses}\\ \text{Minority Interest} &= -\%\text{ share of NCI} \times \text{acquiree net income}\end{aligned}$$

Acquisition method results in higher revenue and expenses, but net income is the same.

Method 4.3.24. *Goodwill Impairment*

i. IFRS: At acquisition, total goodwill recognised is allocated to each of acquirer's cash generating units (lowest level within combined entity monitored for impairment purposes) that will benefit from expected synergies due to the combination with the target.
Impairment testing under one-step approach: If recoverable amount $<$ carrying value of cash-generating unit, then impairment loss is recognised.

$$\text{Impairment Loss} = \text{Carrying value of unit} - \text{Recoverable amount of unit}$$

Impairment loss is first applied to goodwill allocated to cash-generating unit; if reduced to zero, remaining amount allocated to other non-cash assets in the unit on pro-rata basis.

ii. GAAP: At acquisition, total goodwill allocated to each of acquirer's reporting units (operating segment or component of operating segment that is one level below operating segment as a whole).
Impairment testing under two-step approach:

1. If fair value $<$ carrying value of reporting unit (with goodwill), potential impairment identified.

$$\text{Implied goodwill} = \text{Fair value of unit} - \text{Fair value of unit identifiable net assets}$$

2. Impairment loss is difference between carrying value of goodwill and implied fair value of goodwill.

$$\text{Impairment loss} = \text{Carrying value of goodwill} - \text{Implied goodwill}$$

Impairment loss then applied to goodwill allocated to reporting unit; if reduced to zero, no other adjustment made to carrying value of any of reporting unit's other AnL. Prudent to test other asset values for recoverability and possible impairment.

IFRS and GAAP: impairment loss is recorded as separate line item in IS.

4.3.4 Joint Ventures: Equity Method, Consolidation Method

Remark 4.3.25. *Purpose of Joint Ventures (JV)*
For entering foreign markets, conduct specialised activities, engage in risky projects.
May be primarily contractual relationships or common ownership of assets.
Can be partnerships, LLCs (corps) or other legal forms (unincorporated associations).
IFRS identify the characteristic of JVs as follows: a contractual agreement exists between two or more venturers, and the contract establishes joint control.

Method 4.3.26. *Equity Method vs Consolidation Method*

i. Proportional consolidation: require venturer's share of assets, liabilities, income, expenses of JV to be combined or show on line-by-line basis with similar items under its sole control.
ii. Equity method: line item 'equity in income of JV' on IS, line item 'investment in JV' on BS.

Proportionate consolidation results in higher AnL, but stockholder's equity and net assets is the same. Proportionate consolidation also results in higher revenues and expenses, but net income is the same.

4.3.5 Special Purpose Entities, Variable Purpose Entities

Remark 4.3.27. *Purpose of Special Purpose Entities (SPEs)*
Sponsor transfers assets to SPE, obtains right to use assets held by SPE, or perform services for the SPEs. Third party provide funding to the SPE.
Third party interest may take form of debt, equity, participation right, or residual interest in a lease. Sponsor retains significant beneficial interest, even if it may own little or none of SPE's voting equity.
For segregation of certain activities, hence reduce risk and lower cost of financing.
Typically structured such that sponsor has control over SPE finances or operating activities, and third parties have controlling interest in SPE equity.

Remark 4.3.28. *IFRS Sponsor Control of SPEs*
IFRS require consolidation if there is sponsor control, where:

i. Investor has ability to exert influence on financial and operating policy of entity.
ii. Investor is exposed, or has rights to variable returns from involvement with entity.

SPEs involved in structured financial transaction will require evaluation of the purpose, design and risks.

Definition 4.3.29. *Primary Beneficiary*
The party that will absorb the majority of SPE expected losses, receive the majority of SPE expected residual returns, or both.

Remark 4.3.30. *GAAP Classification of SPE as VIE*
VIE includes other entities besides SPEs. Classifies SPE as VIE if one of the conditions is met:

i. Total equity at risk insufficient to finance activities without financial support from other parties; or
ii. Equity investors lack one of the following:
    1. Ability to make decisions
    2. Obligation to absorb losses
    3. Right to receive returns

Method 4.3.31. *GAAP Consolidation for SPEs and VIEs*

i. SPEs: Require primarily beneficiary to consolidate the SPE regardless of its voting interest in the SPE, or its decision-making authority.
Two-component consolidation: variable interest component and voting interest (control) component.

ii. VIEs: Primary beneficiary of VIE must consolidate it as subsidiary regardless of how much equity the beneficiary has in VIE. The entity absorbing majority of losses must consolidate the VIE if another entity receive majority of VIE's expected residual returns. Entities must disclose relationship with VIE even if not the primary beneficiary.
Non-controlling interests in the VIE must be shown on the consolidated BS and IS of primary beneficiary.

4.3.6 Issues that Impair Comparability

Remark 4.3.32. *Contingent Assets and Liabilities*

i. IFRS: contingent assets are never recognised.
Contingent liabilities whose fair value can be measured reliably are recognised at time of acquisition. Subsequently, contingent liabilities measured at the higher of value initially recognised or best estimate of amount needed to settle.

ii. GAAP: Contractual contingent AnL recorded at fair value at date of acquisition. Non-contractual contingent AnL also recorded if 'more likely than not' they meet the definition of an asset or liability.
Subsequently, contingent liabilities are measured at higher of amount initially recognised, or best estimate of amount of the loss. Contingent assets are measured at lower of acquisition date fair value or best estimate of the future settlement amount.

Remark 4.3.33. *Contingent Consideration*
If terms of acquisition involve contingent consideration, this is recognised at fair value under both IFRS and GAAP as an asset, liability, or equity.
Subsequent changes in fair value are recognised in income statement, unless value was originally classified in equity (any changes settle within equity and not on IS).

Remark 4.3.34. *In-Process R&D*
In-Process R&D is capitalised as separate intangible asset, measured at fair value (if can be measured reliably). In subsequent periods, this is subject to amortisation if fully completed, or impairment if no product results or if product is not technically and/or financially viable.

Remark 4.3.35. *Restructuring Costs*
IFRS and GAAP do not recognise restructuring costs. This is recognised as an expense in the periods the restructuring costs are incurred.

Remark 4.3.36. *Choice of Accounting Method on BS and IS Items*

i. Net Income: same for all three methods

ii. Equity: Equity method and proportionate consolidate has same equity. Acquisition method equity will be higher by amount of minority interest.

iii. Assets and Liabilities: highest under acquisition method, lowest under equity method.

iv. Revenues and Expenses: highest under acquisition method, lowest under equity method.

	Equity	Prop Cosol	Acquisition
Net Profit Margin	Higher (sales lower, net income same)	In-Between	Lower
ROE	Higher (equity lower, net income same)	Same as equity method	Lower
ROA	Higher (net income same, assets lower)	In-Between	Lower

4.4 Employee Compensation

Category	Definition	Common Examples
Short-Term Benefits	Compensation expected to be paid within 12 months	• Salaries and wages • Annual bonuses • Non-monetary benefits i.e., medical care • Contributions to social security schemes • Paid leave
Long-Term Benefits	Compensation expected to be paid after 12 months	• Long-term paid leave i.e., sabbatical • Long-term disability benefits
Termination Benefits	Compensation paid during employee termination	• Severance • Continued access to medical and other non-monetary benefits • Career counselling, outplacement services
Share-Based Compensation	Compensation in form or, or in reference to, shares of employer stock	• Restricted stock • Stock options
Post-Employment Benefits	Compensation expected to be paid after employee retirement	• Pension and lump sum payments to retirees • Retiree life insurance, medical care

Remark 4.4.1. *Employee Compensation Underlying Principle*
Recognize compensation costs at fair value in the period that the employee provides services, typically the same period that compensation vests.

	Short-Term Benefits	Share-Based Compensation	Post-Employment Benefits
Typical Vesting Period	Days or weeks	Years	Years, decades
Form of Payment	Cash	Shares[1]	Cash
Amount Recognised Over Vesting Period	Undiscounted salary, wage, etc.	Fair value on grant date	Present value of estimated future benefits

1. Some companies pay share-based compensation settled in cash, which is accounted for like short-term benefits.

4.4.1 Short-Term Benefits Compensation

Method 4.4.2. *Short-Term Benefits Recognition*

i. Compensation expense and corresponding current liability recognised as compensation vests. At settlement, cash is paid (as outflow in CFO), liability de-recognised.

ii. If compensation expenses are capitalised as an asset (expense on IS deferred to when employee service is consumed), costs are capitalised to inventories, then later expensed as COGS.

Remark 4.4.3. *Short-Term Benefits*

i. Income Statement: Vesting period - 'general and administrative expense' with salary for the period

ii. Balance Sheet: Vesting period - 'accrued compensation' with salary for the period
Settlement date - 'accrued compensation' reverses with salary for the period (negative value)

iii. Cash Flow Statement: Settlement period - 'CFO' reverses with salary for the period (negative value)

Remark 4.4.4. *Short-Term Benefits Tied to Inventory*

i. Income Statement: Sale date - if good tied to salary sold, 'cost of sales' increase by salary

ii. Balance Sheet: Vesting period - 'inventory' and 'accrued compensation' both increase by salary
Settlement date - 'accrued compensation' decrease by salary
Sale date - 'inventories' decrease by salary

iii. Cash Flow Statement: Settlement period - 'CFO' decrease by salary

4.4.2 Share-Based Compensation

Method 4.4.5. *Share-Based Compensation Recognition*
Offsetting entry for compensation expense is equity on BS.
Single grant affects financial statements over period of vesting.
Fair value used as measurement on grant date.

Instrument	Other Names	Description
Restricted Stock	• Restricted stock awards • RSUs • Performance shares/units	Awards of shares or share-like units with sale and other restrictions that are lifted upon vesting.
Stock Options	• Share options	Awards of non-tradable call options, typically at the money, on the employer stock.
Stock Appreciation-Based	• Stock appreciation rights • Phantom shares	Awards of cash or shares based on performance of shares over a period
Stock Purchase-Based	• Employee stock purchase plan • Employee stock ownership plan	Permits employees to purchase a limited number of newly issued shares at a discount.

Definition 4.4.6. *Stock Options*
Non-tradable. Compensation expense based on fair value of option on grant date.

i. Income Statement: compensation expense amortised on straight line over vesting period.

ii. Balance Sheet: compensation expense decrease net income and retained earnings. Offsetting entry an increase in share-based compensation reserve (part of equity), hence no change to total equity.

Fair value of option based on observable market price of similar option. Else, may use an option-pricing model. Companies required to disclose assumptions used (i.e., grant date, stock price, maturity, exercise price, risk-free rate), and implied volatility of the option.

Definition 4.4.7. *Conditional Grants and Stock Grants*

i. Restricted stock: requirements that must be met before stock can be sold. May have:

   1. Service condition: specifies number of year years of employment needed before options or stock vest
   2. Performance condition: grant vests upon achievement of a specific target
   3. Market condition: target is based on a market metric.

$$\text{Stock Grant Value} = \text{Stock Value on Grant Date} \times \text{Number of Shares Granted}$$

   Performance shares are performance-based restricted stocks.

ii. Restricted stock units (RSUs): instruments that represent right to receive shares. No voting rights, dividends, not tradable. Preferred over stock options as hey accrue value if stock price is above zero, are simpler for individual tax calculations, and have no exercise price outlays.
   For RSU, stock price is reduced by estimated present value of dividends expected during vesting period.

On settlement, value of stock transferred out of share-based compensation reserve, allocated to common stock and paid-in-capital. For option grants, on exercise, there is a cash inflow from strike price reported as cash inflow for financing activity in the cash flow statement.

Timing for share-based compensation tax:

	Financial Reporting	Tax Return Deduction
Timing	Over the vesting period	At settlement
Amount	Grant-date fair value	• RSUs: Share price on the settlement date • Options: Intrinsic value at exercise

Remark 4.4.8. *Share-Based Compensation for Tax Purposes*
Compensation expense based on stock price on grant date for both option and stock grants.
Tax deduction for stock-based compensation only allowed upon settlement.

$$\begin{aligned}\text{Tax deduction for stock grants} &= \text{share price on settlement date} \times \text{number of shares vested} \\ \text{Tax deduction for options} &= \text{intrinsic value on settlement date} \times \text{number of options vested} \\ &= (\text{stock price on settlement date} - \text{strike price}) \times \text{number of options}\end{aligned}$$

Remark 4.4.9. *Share-Based Compensation on Tax Rates*
Higher share price at settlement results in higher tax deduction than cumulative stock-based compensation expense, resulting in excess tax benefit.

i. IFRS: recognised in equity, hence have more stable effective tax rates

ii. GAAP: recognised in income tax expense on IS, results in volatility in effective tax rate. May cause large differences between issuer effective and statutory tax rates.

Condition	IFRS	GAAP
Share price on settlement date > grant date (excess tax benefit or tax windfall)	Gain recognised directly in shareholder equity	Decrease in income tax expense on income statement
Share price on settlement date < grant date (tax shortfall)	Loss recognised directly in shareholder equity	Increase in income tax expense on income statement

Method 4.4.10. *Treasury Stock Method*
Treasury stock method adds 'net' amount of potentially dilutive securities (i.e., unvested RSUs) to basic shares outstanding. Proceeds from exercise or conversion of potentially dilutive securities assumed to repurchase shares at the average share price for the reporting period.

$$\text{Basic shares outstanding} + \text{Shares from conversion} - \text{Number of treasury shares} = \text{Diluted shares outstanding}$$

Performance shares vested based on period of service are considered dilutive if stock price has not declined substantially. Expectations about vesting of shares based on other performance metrics is more subjective.
Unvested options that are in-the-money are considered dilutive.
RSUs and restricted stock grants are anti-dilutive only if current stock price is significantly less than price on grant date (unrecognised compensation expense per share higher than current market price).
Rapid increase in share price can result in more dilution.

$$\text{Number of treasury shares} = \frac{\text{Assumed proceeds}}{\text{Average share price during reporting period}}$$

$$\text{Assumed proceeds} = \text{Cash proceeds} + \text{Average unrecognised share-based compensation expense}$$

$$\text{Cash proceeds} = \text{Number of options} \times \text{Exercise price}$$

$$\text{Share-based compensation expense} = \text{Unvested awards} \times \text{Grant-date fair value}$$

where 'Average unrecognised share-based compensation expense' is the average of last two period-end values of amortised amounts of share-based expense. Cash proceeds is zero for stock grants.
Method nets number of hypothetically repurchased shares against total number of potentially dilutive securities.
Diluted EPS cannot exceed basic EPS; companies that report net loss will report same basic and diluted shares.

Remark 4.4.11. *Anti-Dilutive Securities for Treasury Stock Method*
Two cases where anti-dilutive securities should be added to diluted shares outstanding for valuation:

i. Companies with net loss. As diluted EPS cannot exceed basic EPS, companies will report equal amount of basic and diluted shares outstanding. Be alert to unprofitable companies that use significant amounts of share-based compensation.
ii. Companies with large share price declines, or volatile share price.

Remark 4.4.12. *IFRS Share-Based Compensation Disclosures*

i. Nature and extent of compensation arrangement
ii. How the fair value of equity granted during the period was determined
iii. Effect on company's net income during the period and on financial position

Remark 4.4.13. *Forecasting Share-Based Compensation*

i. Income Statement: typically not a discrete line item.
If an operating expense item share drivers and/or includes some share-based compensation, then separation of compensation expenses is not required for forecasting purposes.
Else, first subtract amounts attributable to compensation from each relevant category, then forecast individual expenses as proportion of revenues (based on historical trends), finally forecast this separately.
Use historical data, management guidance, assumptions on reversion to industry mean to forecast.
ii. Cash Flow Statement: compensation to be added back to net income to arrive at CFO. Expected cash inflow from option exercise should be reflected in CFF.

Remark 4.4.14. *Forecasting Shares Outstanding*

i. Unvested Grants: use diluted number of shares outstanding as reported.
ii. Future grants: discount estimated value of equity by a dilution factor, or by estimating an increase in number of shares outstanding.
iii. Settlement of Awards: based on growth rates of historical values, or by assuming that a percentage of outstanding awards settles each period.

Basic $\text{shares}_{\text{Begin}}$ + RSU vested, options exercised + shares from secondaries, acquisitions − share repurchase = Basic $\text{shares}_{\text{End}}$

Diluted shares = Basic $\text{shares}_{\text{End}}$ + Number of diluted securities

Option exercises will affect CFS and BS, as cash is received from exercises. RSU vesting does not materially affect financial statements.

Remark 4.4.15. *Valuation Considerations*
Valuation model needs to be modified to account for effect of:

i. Dilution from outstanding but unvested share-based awards.
May use diluted shares outstanding to compute per-share value.
Alternatively, may use basic shares outstanding add gross amount of potentially dilutive securities (including share-based awards) as the share count instead.

ii. Dilution from future share-based awards.
In DCF valuation, to deduct share-based compensation from FCF.
Alternatively, reduce equity value by an estimation dilution factor or increasing share count by additional amount. Method is more time consuming, should deliver same result.

Remark 4.4.16. *Comparison of Companies with Compensation*
As share-based compensation is non-cash, companies with higher non-cash compensation will report higher FCF and any other CF measure.
Ratios using CF measures in relative valuation ma hence be misleading when there are significant differences in compensation structure across companies.

4.4.3 Post-Employment Compensation

Definition 4.4.17. Pension Arrangements

i. *Defined Contribution (DC)*: employer contributes certain sum each period to employee retirement account.
Contribution based on factors such as years of service, age, compensation, profitability, percentage of employee contribution.
No promises made to employee on future value of plan assets.
Investment decisions left to employee.

ii. *Defined Benefit (DB)*: employer promises lump sum or periodic payment to employee after retirement.
Periodic payment based on years of service, compensation at retirement.
As employee future benefit is predetermined, employer bears all investment risk.
Employers required to pre-fund DB plans by setting aside assets in a separate legal entity, and make contributions to plan assets to meet minimum funding levels or on discretionary basis.
Employer contributions are tax deductible; company may make contributions only in years when it has positive taxable income.

iii. *Other Post-Employment Benefits (OPEB)*: healthcare for retirees etc.

Benefit	Benefit Amount	Employer Obligation	Pre-Funding
DC	• Future benefit amount not defined • Actual future benefit depend on contributions and investment performance of plan assets • Investment and actuarial risks borne by employee	• Amount of obligation defined in each period • Contribution made on periodic basis with no future obligation	Not applicable
DB	• Amount of future benefit defined based on plan's formula • Investment and actuarial risks borne by employer	• Amount of future obligation based on plan formula, must be estimated in current period	• Funded by contributing funds to pension trust • Regulatory funding requirements vary by country
OPEB	• Amount of future benefit depends on plan specs, type of benefit • Investment and actuarial risks borne by employer	• Eventual benefits are specified • Amount of future obligation to be estimated now	• Typicall not funded

Method 4.4.18. *Defined Contribution Accounting Process*

i. Grant: estimate un-discounted value of plan contribution for the period

ii. Vesting: recognise plan contributions as compensation expense and accrued compensation liability over vesting period. Adjust or reverse entries if needed for changes in estimates

iii. Settlement: employer makes contribution to plan. Accrued compensation liability is disrecognised.

Method 4.4.19. *Defined Contribution on Financial Statements*

i. Balance Sheet: current liability for vested but not-yet-settled contributions

ii. Income Statement: plan contributions recognised within operating expense category

iii. Cash Flow Statement: cash outflow in CFO

Remark 4.4.20. *Pension Expense*
Pension expense does not include employer contributions to plan and settlement of benefits. It is non-cash accrual based on change in net pension liability/asset.

Definition 4.4.21.
The *Projected Benefit Obligation (PBO)* is the actuarial value (at assumed discount rate) of all future pension benefits earned to date, based on expected future salary increases.
Measures value of obligation, assuming going concern, and employee will work for firm until retirement.
Discount rate for present value computation is typically yield on investment-grade corporate bonds.

Definition 4.4.22. *Funded Status of Plan*
Funded status = Fair value of plan assets − PBO

i. Overfunded: if plan assets exceed pension obligation. Reported on BS as net pension asset.

ii. Underfunded: If pension obligation exceeds plan assets. Reported on BS as net pension liability.

Definition 4.4.23.
Current service cost is present value of benefits earned by employees during current period.
Represent increase in PBO that results from employees working one more period.
Income Statement: recognised 'above the line' (before EBIT).

Definition 4.4.24.
Past service cost is plan amendments made retroactively.
PBO immediately increased by present value of increased benefits already earned. Beginning PBO is understated by the amount of past service cost.

i. IFRS: past service costs are recognised in PnL immediately and not amortised

ii. GAAP: reported as part of OCI, amortised over average service life of affected employees

Definition 4.4.25. *Interest Costs*

i. IFRS: Net interest income/expense = (Beginning funded status − Past service cost) × Discount rate
Income Statement: recognised below operating income, with other financing costs.

ii. GAAP: Interest cost = (Beginning BPO + Past service cost) × Discount rate
Income Statement: recognised in interest expense below operating income line.

If resulting amount is negative (underfunded), expense is reported. If positive, report as net interest income.

Definition 4.4.26. *Expected Return on Plan Assets*
Employer contributes assets to a trust to satisfy pension obligation in the future.
Expected return on plan assets has no effect on PBO or fair value of plan assets; this is used as offset for computation of reported pension expense.

$$\text{Expected return on plan assets} = \text{Expected rate of return} \times \text{Fair value of plan assets at beginning of period}$$

Expected rates of return to be based on historical asset return and plan's asset allocation.
Difference between expected and actual return is combined with other items related to changes in actuarial assumptions into 'actuarial gains and losses' account.

i. GAAP: Expected return is offset in earnings.

ii. IFRS: Expected rate of return on plan assets is assumed to be same as discount rate, and is netted against interest cost and a net interest cost/income is reported.

Definition 4.4.27. *Actuarial Gains and Losses (GnL)/Re-measurements*
Two components within actuarial gains and losses:

i. Gains and losses due to decrease or increase in PBO caused by changes in actuarial assumptions

ii. Difference between actual and expected return on plan assets

Actuarial gains and losses are recognised in OCI.

i. IFRS: Actuarial gains and losses are never amortised

ii. GAAP: Actuarial gains and losses are amortised using corridor approach

Method 4.4.28. *GAAP: Corridor Approach*
Cumulative unrecognised actuarial gains and losses $> 10\% \times \max(\text{pension obligation},\ \text{fair value of plan assets})$, then the excess amount is amortised over expected average remaining working lives of employees in the plan. Amortisation of actuarial gain reduces pension cost, while amortisation of a loss reduces pension cost.

Method 4.4.29. *Defined Benefits: Benefit Obligation*

$$\begin{aligned}\text{Periodic pension cost} &= \text{Employer contributions} - (\text{Ending funded stats} - \text{Beginning funded status})\\ &= (\text{Current} - \text{Past service cost}) + \text{Interest expense} - \text{Asset actual return} + \text{Actuarial GnL}\\ \text{End benefit obligation} &= \text{Begin benefit obligation} + \text{Service and interest cost} - \text{Benefits paid} + \text{Actuarial GnL}\\ \text{End asset fair value} &= \text{Begin asset fair value} + \text{Asset actual return} + \text{Employer contribution} - \text{Benefits paid}\end{aligned}$$

Component	GAAP	IFRS
Current service cost	Income statement	Income statement
Past service cost	OCI, amortised over service life in subsequent years	Income statement
Interest cost	Income statement	Income statement[1]
Expected return	Income statement	Income statement[1]
Actuarial GnL	Amortised portion in income. Unamortised in OCI	All in OCI - not amortised

1. IFRS: expected rate of return on plan assets equals discount rate, and net interest expense/income is reported.

Method 4.4.30. *IFRS Periodic Pension Cost (Income Statement)*

$$\begin{aligned}\text{Periodic pension cost} &= (\text{Current} + \text{Past service cost}) + \text{Net interest expense or income}\\ \text{Net interest expense or income} &= \text{Discount rate} \times (\text{Beginning BPO} - \text{Beginning plan assets})\end{aligned}$$

Method 4.4.31. *GAAO Periodic Pension Cost (Income Statement)*

$$\begin{aligned}\text{Periodic pension cost} &= \text{Current service cost} + \text{Amortised past service cost} + \text{Interest expense}\\ &\quad - \text{Asset expected return} + \text{Amortised actuarial GnL}\\ \text{Interest expense} &= \text{Discount rate} \times \text{Beginning BPO}\\ \text{Asset expected return} &= \text{Expected rate of return} \times \text{Beginning plan assets}\end{aligned}$$

Definition 4.4.32. *IFRS Required Disclosures - IAS 19*
DC Plans: disclose amount recognised as expense in notes to financial statements as part of note titled 'Employee Compensation', 'Post-Employment Benefits' or similar.
DB Plans: required to make following disclosures:

i. disclose main characteristics of plan and risks involved,

ii. identify and explain the figures in financial statements arising from them

iii. describe the amount, timing, and uncertainty of future cash flows

Assumption	Net Pension Liability (Asset)	Periodic Pension Cost/Expense
Higher discount rate	Lower obligation	Pension cost and expense will both be lower because of lower opening obligation and lower service costs
Higher rate of compensation increase	Higher obligation	Higher service and interest cost will increase periodic costs and expense
Higher expected return on plan assets	No effect, as fair value of plan assets are used on BS	• IFRS: Not applicable • GAAP: No effect on cost, lower expense

Method 4.4.33. *Analysis of Post-Employment Benefits*
Compare the assumptions (in footnotes) over time and across firms to assess quality of earnings.

Aggressive accounting choices (reduce pension expense and PBO) include low life expectancy of plan beneficiaries, low future inflation, low salary growth rate, and high discount rate.
For GAAP, assuming higher expected rate of return on plan assets reduces reported pension expense, but does not affect the PBO or future value of plan assets.

Method 4.4.34. *DC Plans Financial Modelling*
Implicitly done by making operating expense forecasts.
Cash flows well matched with recognised expense.
Balance sheet limited to accrued liabilities already forecasted using working capital ratios.

Method 4.4.35. *DB, OPEB Plans Financial Modelling*
Model service cost, net interest expense/income, re-measurements, future contributions.
Valuation must account for 2 impacts:

i. Plan's funded status, either a net liability or net asset.
   For underfunded plan, the liability is included in debt, and to be deduced during EV calculation. Overfunded plan is ignored in valuation.

ii. Future service costs are not included in plan's funded status.
   However, to still deduct this cost from FCF in a DCF. Net interest expense/income not to be included in DCF as it represents unwinding of discounted pension obligation. Valuation is done on PV basis. The PV of underfunded pension is already considered by deducting the net pension liability from EV.

4.5 Multinational Operations

Remark 4.5.1. *Foreign Currency on MNC*

i. MNC may engage in business transactions denominated in foreign currency

ii. MNC may invest in subsidiaries that maintain their books and records in foreign currency

Definition 4.5.2. Currency Types

i. *Local Currency*: currency where the company operates.

ii. *Functional Currency*: currency of the primary economic environment in which the entity operates. The currency in which the entity generates and expends cash. May be in local currency or some other currency.

iii. *Presentation Currency*: currency in which the parent company prepares its financial statements.

Transaction	Type of Exposure	Foreign Curr Strengthen	Foreign Curr Weaken
Export sale	Asset (account receivable)	Gain	Loss
Import purchase	Liability (Account payable)	Loss	Gain

Remark 4.5.3. *Exposure to Transaction Exposure*
Transaction exposure are related to imports and exports:

i. Import Purchase: importer pay in foreign currency and allowed to defer payment. Exposed to risk that foreign currency appreciate, increasing functional currency amount required to acquire foreign currency.

ii. Export Sale: exporter paid in foreign currency and allowed payment to be deferred. Exposed to risk that foreign currency depreciate, decreasing functional currency which the foreign currency can be converted.

Definition 4.5.4. *Foreign Currency Risk*
Risk arises only when transaction date and payment date are different.
If balance sheet date occurs before transaction is settled, foreign currency gain and loss are recognised on IS. Subsequent gains and losses are recognised from BS date through the settlement date. Adding gain and losses for both accounting periods produces amount equal to actual realised gain or loss on foreign currency transaction.

Remark 4.5.5. *Disclosure of Transaction Gains and Losses*
IFRS, GAAP do not require disclosure of where such gains and losses would be recorded. Typically placed as:

i. a component of other operating income/expense; or

ii. a component of non-operating income/expense; or

iii. as part of net financing cost

Operating profit margin is then affected by where the gain and loss is placed.

4.5.1 Translation of Foreign Currency Financial Statements

Method 4.5.6. Methods to remeasure or translate financial statements are as follows:

i. *Re-measurement*: converting local currency into functional currency using temporal method

ii. *Translation*: converting functional currency into parent presentation currency with current rate method.

The method chosen is determined by functional currency relative to parent presentation currency.

Method 4.5.7. *IFRS on Deciding on Functional Currency*

i. Currency mainly influences sales prices for goods and services

ii. Currency of country whose competitive forces and regulations mainly determine the sales price of its goods and services

iii. Currency that mainly influences labour, material, and other costs of providing goods and services

iv. Currency in which funds from financing activities are generated

v. Currency in which receipts from operating activities are usually retained.

To determine in whether the foreign entity functional currency is same as parent functional currency:

i. If the activities of foreign operation are an extension of parent, or are autonomous

ii. If transactions with parent is large or small proportion of foreign entity activities

iii. If CF generated by foreign entity directly affect CF of parent and are available to be remitted to parent

iv. If operating CF generating by foreign operations are sufficient to service existing and normally expected debt; or whether the foreign entity will need funds from the parent to service its debt

Method 4.5.8. *Determining Appropriate Translation Method*

i. Current Rate Method: Functional Currency $\neq$ Presentation Currency.
Translation involves self-contained, independent subsidiaries whose operating, investing, and financing activities are decentralised from the parent.

ii. Temporal Method: Functional Currency = Presentation Currency.
Re-measurement occurs when subsidiary is well integrated with the parent.

iii. Monetary/Non-Monetary (Mixed) Method: Local Currency $\neq$ Functional Currency $\neq$ Presentation Currency.
Temporal method used to remeasure from local currency into functional currency, then current rate method used to translate functional currency into presentation currency.

iv. Hyper-inflationary Environment:

1. IFRS: subsidiary financial statements restated for inflation, translated using current exchange rate
2. GAAP: functional currency considered to be parent's presentation currency, temporal method used

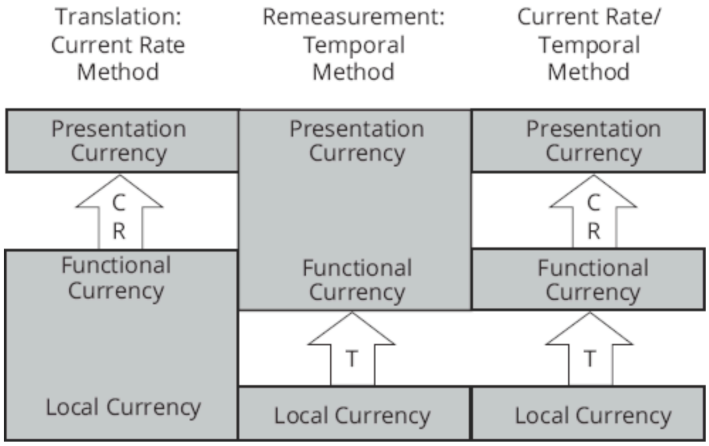

Figure 5: Translation and re-measurement methods

Definition 4.5.9.

i. *Current Rate*: exchange rate on balance sheet date

ii. *Average Rate*: average exchange rate over reporting period

iii. *Historical Rate*: actual rate in effect when original transaction occured

Remark 4.5.10. *Temporal Method on Inventory and COGS*

i. FIFO: ending inventory remeasured based on more recent rates. However, COGS consists of costs that are older; hence exchange rates used to remeasure COGS are older.

ii. LIFO: ending inventory remeasured based on older costs. However, COGS consists of costs from most recently purchased goods; hence COGS is remeasured based on more recent exchange rates.

iii. Weighted-Average: ending inventory and COGS remeasured with weight-average exchange rate

Remark 4.5.11. *Temporal Method Overview*
Translation adjustment needed to keep translated BS in balance is reported as gain or loss in net income (GAAP: re-measurement gains and losses).
Method results in either net asset or net liabilities (if exposed asset greater than or less than liabilities).

Remark 4.5.12. *Current Rate Method Overview*
Entire investment in foreign entity is exposed to translation gain or less. Hence all assets and liabilities must be revalued at each BS date. Net translation gain and loss is unrealised except when entity is sold; this is cumulated and deferred on BS as separate component of stockholder equity.
Method results in net asset BS exposure (as total assets greater than total liabilities).

Translation Item	Current Rate	Temporal
Assets		
Monetary (e.g., cash, receivables)	Current rate	Current rate
Non-monetary		
• measured at current value (marketable securities etc.)	Current rate	Current rate
• measured at historical costs (PPE, intangibles etc.)	Current rate	Historical rate
Liabilities		
Monetary (accounts payable, accrued expenses, LT debt, deferred income taxes)	Current rate	Current rate
Non-monetary		
• measured at current value	Current rate	Current rate
• Not measured at current value (e.g., deferred revenue)	Current rate	Historical rate
Equity		
Other than retained earnings	Historical rate	Historical rate
Retained earnings	Historical rate[1]	Historical rate[1]
Revenues and SG&A	Average rate	Average rate
Expenses		
Most expenses	Average rate	Average rate
Expenses related to assets translated at historical rates (i.e., COGS, depreciation, amortisation)	Average rate	Historical rate
Translation adjustment on parent financial statement	Equity[2]	Net Income GnL
Common Stock	Historical rate	Historical rate
Cost of Goods Sold	Average rate	Historical rate
Depreciation and Amortisation	Average rate	Historical rate
Net Income	Average rate	Mixed rate
Equity (as a whole)	Current rate	Mixed rate
Exposure	Net assets	Net monetary assets

1. Beginning balance plus translated net income less dividends translated at historical rate
2. Accumulated as separate component of equity

Remark 4.5.13. *Translation Adjustments*

BS Exposure	Local Currency Appreciates	Local Currency Depreciates
Net Assets	Positive	Negative
Net Liabilities	Negative	Positive

Cumulative translation adjustment is used to keep translated BS in balance; this is sum of translation adjustments over successive accounting periods.

Remark 4.5.14. *Exposure to Changing Exchange Rates*

i. Current Rate Method: exposure is the net asset position of subsidiary (if assets exceeds its liabilities).
If subsidiary has net asset exposure, and local currency is appreciating, a gain is recognised.
A net asset exposure in depreciating environment will result in a loss.
Firm with net liability position is unusual; most firm can't survive very long in this scenario.

ii. Temporal method: Only monetary assets and liabilities exposed to changing rates.
If monetary liabilities exceed monetary assets, firm has net monetary liability exposure. Net monetary liability exposure (NMLE) when foreign currency is appreciation results in a loss.
Net monetary liability exposure coupled with depreciating currency will result in a gain.
Firms may limit exposure by balancing monetary assets and monetary liabilities.

Method 4.5.15. *Translation of Retained Earnings*
At end of first year, foreign currency (FC) retained earnings (R/E) are translated into parent currency (PC):

Net income in FC	[Translated with method used to translate IS]	= Net income in PC
− Dividends in FC	× Exchange rates when dividends declared	= − Dividends in PC
R/E in FC		R/E in PC

Retained earnings in PC at end of first year become beginning retained earnings in PC for second year. The retained earnings in second and subsequent years are calculated as follows:

Beginning R/E in FC	[From last year's translation]	→ Beginning R/E in PC
+ Net income in FC	[Translated with method used to translate IS]	= + Net income in PC
− Dividends in FC	× Exchange rates when dividends declared	= − Dividends in PC
End R/E in FC		End R/E in PC

Remark 4.5.16. *Currency Exchange Rate Movement on Financial Statements*

	Temporal, NMLE	Temporal, NMAE	Current Rate
Foreign Appreciation	• ↑ Revenues • ↑ Assets • ↑ Liabilities • ↓ Net Income • ↓ Shareholder's equity • Translation loss	• ↑ Revenues • ↑ Assets • ↑ Liabilities • ↑ Net Income • ↑ Shareholder's equity • Translation gain	• ↑ Revenues • ↑ Assets • ↑ Liabilities • ↑ Net Income • ↑ Shareholder's equity • + Translation Adjust
Foreign Depreciation	• ↓ Revenues • ↓ Assets • ↓ Liabilities • ↑ Net Income • ↑ Shareholder's equity • Translation loss	• ↓ Revenues • ↓ Assets • ↓ Liabilities • ↓ Net Income • ↓ Shareholder's equity • Translation gain	• ↓ Revenues • ↓ Assets • ↓ Liabilities • ↓ Net Income • ↓ Shareholder's equity • − Translation Adjust

Remark 4.5.17. *Current Rate Method on Financial Ratios*
Let pure ratios be ratios consisting of components from a single financial statement, i.e., BS only, IS only.

i. Pure balance sheet and pure income statement ratios unaffected (local currency trends are preserved)

ii. If foreign currency is depreciating (appreciating), translated mixed ratios (with IS item in numerator, end-of-period BS item in denominator) will be larger (smaller) than original ratio.

Method 4.5.18. *Procedure for Analysis of Choice of Method on Ratio*

i. Determine whether the foreign currency is appreciating or depreciating

ii. Determine the rate (historical, average, or current) used to convert the numerator under both methods. Determine if the numerator of the ratio will be same, larger, or smaller under both methods.

iii. Determine the rate (historical, average, or current) used to convert the denominator under both methods. Determine if the denominator of the ratio will be same, larger, or smaller under both methods.

iv. Determine whether the ratio will increase, decrease, or stay the same based on direction of change in numerator and denominator.

4.5.2 Hyper-Inflationary Economy

Definition 4.5.19. *Hyper-Inflationary Environment*
Economy where cumulative inflation is approaching or is over 100% in three-year period.

Method 4.5.20. *Reporting in a Hyper-Inflationary Environment*

i. IFRS:

1. BS monetary assets and monetary liabilities not restated
2. BS non-monetary assets and non-monetary liabilities restated for inflation using price index. As non-monetary items are carried at historical cost, multiply original cost by change in price index for the period between acquisition date and balance sheet date.
3. BS components of shareholder's equity (other than retained earnings) restated by applying change in price index from beginning of period or date of contribution if later
4. BS retained earnings will be residual figure that balances the balance sheet
5. IS items restated by multiplying change in price index from the date the transactions occur
6. IS net purchasing power gain or loss recognised based on the net monetary asset or liability exposure.
   Holding monetary assets during inflation results in purchasing power loss.
   Holding monetary liabilities during inflation results in purchasing power gain.
   This forces net income to be same as net income that was residual in statement of retained earnings.

Once subsidiary's financial statements are adjusted for inflation, these are translated into parent reporting currency using current exchange rate.

ii. GAAP: Temporal method used. Require foreign entity financial statements to be remeasured as if functional currency were the reporting currency.

Remark 4.5.21. *Inflation Method vs Temporal Method*

i. Under temporal method, monetary assets and liabilities are exposed to changing exchange rates.
In inflation method, the monetary assets and liabilities are exposed to risk of inflation.

ii. Purchasing power GnL analogous to exchange rate GnL when foreign currency is depreciating.

iii. Re-measurement GnL is recognised in IS, as is net purchasing power GnL from inflation.

4.5.3 Disclosures for Multinational Operations

Remark 4.5.22. *Disclosures on Translation Method*
IFRS and GAAP require two types of disclosures:

i. amount of exchange differences recognised in net income; and

ii. amount of cumulative translation adjustment classified in a separate component of equity, along with reconciliation of amount of cumulative translation adjustment at the beginning and end of the period.

GAAP specifically also requires disclosure of amount of translation adjustment transferred from stockholder equity and included in current income from disposal of foreign entity.
The amount of exchange differences recognised in net income consists of:

i. foreign currency translation gains and losses, and

ii. translation gains and losses resulting from application of temporal method.

Definition 4.5.23.

i. *Clean Surplus Accounting*: all non-owner changes in equity equity, such as translation adjustments are included in determination of net income.

ii. *Dirty Surplus Accounting*: some income items are reported as part of shareholder's equity, rather than as gains and losses on income statement

Definition 4.5.24.

i. *Effective tax rate*: tax expense divided by pretax profit, in income statement

ii. *Statutory tax rate*: tax rate by the home country

iii. *US Tax Regime*: MNC owes taxes on foreign income only to extent that the US corporate tax exceeds foreign rate of tax on that income. Foreign income earned by US MNC is not taxed until it is repatriated.

Entity with operations in multiple countries may aim to set transfer prices such that higher portion of its profit is allocated to lower tax jurisdictions.

Remark 4.5.25. *Disclosures on Tax Implications*
Accounting standards require companies to provide reconciliation between effective and statutory tax rate. The reconciliation disclosure can be used to project future tax expense.

Remark 4.5.26. Changes in effective tax rate on account of foreign operations can be due to:

i. Changes in mix of profits from different countries with varying tax rates

ii. Changes in the tax rates

Remark 4.5.27. *Disclosures Related to Sales Growth*
Foreign currency effects on sales are disclosed in MD&A section of annual reports.
Growth in sales due to changes in volume, price is more sustainable than those from changes in exchange rates.

Remark 4.5.28. *Disclosures Related to Major Sources of Foreign Exchange Risk*
Disclosures in MD&A include sensitivity analysis, with information on major sources of foreign exchange risk given its country of operations, and disclosure of profit impact of a given change in exchange rates.

4.6 Analysis of Financial Institutions

Remark 4.6.1. *Financial Institutions Characteristics*

i. Systematic Importance: necessary for smooth functioning and overall health of the economy. As an intermediary between providers and users of capital, this creates inter-dependences that will introduce a system-wide failure if one institution fails (contagion effect). Bank deposits are insured up to a certain limit by the government to avoid financial contagion and reduce the risk of bank runs.

ii. Regulated: financial institutions are highly regulated, with minimum capital requirements, minimum liquidity requirements, and limits on risk-taking.

iii. Assets: assets are financial assets such as loans and securities that are usually reported at fair value.

Remark 4.6.2. *Basel III Framework*:

i. Minimum required capital for a bank based on risk of bank's assets. The riskier the bank assets, the higher the required capital.

ii. Minimum liquid assets to meet demands under a 30-day liquidity stress scenario.

iii. Require stable funding relative to bank's liquidity needs over a one-year time horizon. Stability in funding is proportional to tenor of bank's deposits; longer-term deposits are more stable than shorter-term deposits. Stability also depends on the type of deposit.

Basel III prompted banks to focus on asset quality, hold capital against other types of risk (i.e, operational risk), develop risk assessment processes.

4.6.1 CAMELS Approach

Definition 4.6.3. *Bank Capital Tiers*

i. Tier 1 Capital

   1. Common Tier 1 Capital: common stock, additional paid-in capital, issuance surplus related to common stock, retained earnings, OCI less intangibles and deferred tax assets.
   2. Other Tier 1 Capital: subordinated instruments with no specific maturity and no contractual dividends (i.e., preferred stock with discretionary dividends).

ii. Tier 2 Capital: subordinated instruments with original (when issued) maturity of more than five years.

Tier 1 plus Tier 2 capital makes up total capital of the bank.

Definition 4.6.4. *Capital Adequacy*
Proportion of bank assets funded with capital, adjusted based on risk (riskier assets have heavier weighting). Risk weighting specified by individual country regulators with Basel III.
Basel III guidelines specify the following:

i. Common Tier 1 Capital $\geq 4.5\%$ of risk-weighted assets

ii. Total Tier 1 Capital $\geq 6.0\%$ of risk-weighted assets

iii. Total Capital (Tier 1 + Tier 2) $\geq 8.0\%$ of risk-weighted assets

Definition 4.6.5. *Asset Quality*
Assess amount of existing and potential credit risk associated with bank assets, focusing on financial assets. Loans asset quality depends on creditworthiness of borrowers and corresponding adequacy of adjustments for expected loan losses. Measured at amortised cost, shown on BS net of allowances for loan losses.

	Equity	Debt
IFRS	• Fair value through OCI • Fair value through PnL	• Amortised cost • FVOCI • Fair value through PnL
GAAP	• Fair value through PnL	• Amortised cost (held-to-maturity) • FVOCI (available for sale) • Fair value through PnL (trading)

Remark 4.6.6. *Asset Quality: Credit Risk*

i. Off-balance sheet trading activities create exposure to counterparty credit risk.

ii. Off-balance sheet obligations such as guarantees, unused committed credit lines, LOC create credit risk.

Remark 4.6.7. *Asset Quality: Loan Loss Provisions*
'Allowance for Loan Losses' is a contra asset account to loans, the result of 'Provision for Loan Losses', an expense subject to management discretion. To evaluate bank policy of setting aside adequate provisions relative to actual loan performance. Actual losses are then written off these provisions.
Useful ratios for evaluation (that compares discretionary metric to more objective measure) are:

i. Ratio of allowance for loan losses to nonperforming loans
ii. Ratio of allowance for loan losses to net loan charge-offs
iii. Ratio of provision for loan losses to net loan charget-offs

Definition 4.6.8. *Management Capabilities*
Risk management and internal control is critical for banks.
To look out for strong governance structure, sound internal controls, transparent management communication, financial reporting quality. Management should be able to identify and control risk, including credit risk, market risk, operating risk, legal risk, and other risks.

Definition 4.6.9. *Earnings*
Financial institutions should provide adequate return on capital, reward stockholders through capital appreciation and/or distribution of earnings. Look for high quality earnings from sustainable items.
Earnings estimates are based on the following:

i. Loan impairment allowances: assessments on likelihood of borrower default or bankruptcy, value of the collateral. Sensitive to risk factors such as economic and credit conditions across geographies.
ii. Financial assets and liabilities valuation with fair value hierarchy.
iii. Other areas common with non-financial companies, such as goodwill impairment, deferred tax asset, liability to recognise in connection with contingencies.

Examine composition of earnings, which comprise of net interest income, service income, trading income (by most to least sustainable). Highly volatile net interest income may indicate excessive interest rate risk exposure.

Definition 4.6.10. *Fair Value Hierarchy*

i. Level 1: quoted prices for identical financial assets and liabilities in active markets
ii. Level 2: quoted prices for similar financial instruments in active markets, quoted prices for identical financial instruments in non-active markets, observable data such as interest rates, yield curves, credit spreads, implied volatility. Used to model fair value of financial instrument.
iii. Level 3: fair value based on model and unobservable inputs. More subjective.

Definition 4.6.11. *Maturity Transformation*
Banks create value by borrowing money on shorter terms than terms for lending to customers. May destroy value if markets for short-term funding has a dislocation, or yield curve unexpectedly inverts.

Definition 4.6.12. *Liquidity Position*
Adequate liquidity is crucial for a bank. Basel III has two minimum liquidity standards:

i. Liquidity Coverage Ratio (LCR):

$$\text{LCR} = \frac{\text{Highly Liquid Assets}}{\text{Expected Cash Outflows}} \geq 100\%$$

Highly liquid assets are those that are easily convertible into cash.
Expected cash flows are the estimated one-month liquidity needs in a stress scenario.

ii. Net Stable Funding Ratio (NSFR):

$$\text{NSR} = \frac{\text{Available Stable Funding}}{\text{Required Stable Funding}} \geq 100\%$$

Available stable funding (ASF) is a function of the composition and maturity distribution of bank funding sources (i.e., capital, deposits, and other liabilities).
Required stable funding is a function of the composition and maturity distribution of bank asset base.
NSFR relates liquidity needs of bank assets to liquidity provided by bank liabilities (i.e., funding sources).

Other liquidity monitoring metrics recommended by Basel III includes:

i. Concentration of Funding: proportion of funding obtained from single source. Lack of diversification may pose a problem when the sources withdraw funding, resulting in heightened liquidity risk for the bank.

ii. Maturity Mismatch: when asset maturities differ materially from maturity of liabilities. The higher the mismatch, the higher the liquidity risk for the bank, which may expose the bank to a liquidity crunch if it is unable to roll over its borrowings at reasonable rates.

Funding Component of ASF	ASF Factor
• Total regulatory capital (exclude Tier 2 instruments maturing in a year) • Other capital instruments and liabilities with residual maturity > 1 year	100%
• Stable demand deposits and term deposits with residual maturity < 1 year from retail and small business customers	95%
• Less stable demand deposits and term deposits with residual maturity < 1 year from retail and small business owners	90%
• Funding from non-financial corporate customers, sovereign, public sector, multilateral, national development banks with residual maturity < 1 year • Operational deposits • Other funding with residual maturity > 6 months and < 1 year not included in above categories, including funding from central banks and financial institutions	50%
• All other liabilities not included in above categories, including liabilities without stated maturity (specific treatment for deferred tax liabilities, minority interests) • NSFR derivative liabilities net of NSFR derivative assets (if NSFR derivative liabilities $>$ NSFR derivative assets) • 'Trade date' payables from purchase of fin instruments, foreign currencies, commodities	0%

Definition 4.6.13. *Sensitivity to Market Risk*
Exposure to changes in interest rates, exchange rates, equity prices, or commodity prices.
Mismatches in maturity, repricing frequency, reference rates, or currency of bank loans and deposits create exposure to market movements.
Value at risk (VaR may be used to measure and monitor market risk.

4.6.2 Non-CAMELS Factors

Remark 4.6.14. *Government Support*
Larger banks have higher probability of implicit government support due to risk of contagion effect.
Government agencies will close banks that might fail, or arrange mergers with healthy ones to absorb them.
Factors include size of bank, status of country's banking system (capacity to absorb single bank failure).

Remark 4.6.15. *Government Ownership*
Public ownership increases faith of implicit government backing in a bank.
Governments may aid financial development of banks, leading to broad economic growth.

Remark 4.6.16. *Mission of Banking Entity*
Community banks may by guided by community development in their lending decisions.
If community dependent on primary industry, may lead to concentration of risk in bank asset portfolio.

Remark 4.6.17. *Risk Factors*
Fill gaps on legal and regulatory issues, present in annual filing.

Remark 4.6.18. *Basel III Disclosures*
Provide regulatory information on consistent, comparable basis

Remark 4.6.19. *Corporate Culture*
Culture evaluation can be conducted by a review of:

i. Diversity of bank assets. If losses generated due to narrow investment strategy, then bank is too aggressive.

ii. Accounting restatements due to failures of internal controls indicate unethical culture.

iii. Excessive management compensation tied to bank stock performance may lead to excessive risk-taking.

iv. Speed with which bank adjust loan loss provisions relative to actual loss behaviour. Slower response rate indicates aggressive accounting practices and a risk-taking culture.

General factors relevant to analysis includes:

i. Competitive environment: global banks may take excessive risks to outdo large rivals.

ii. Off-balance-sheet assets and/or liabilities may be opaque. Look for VIEs and SPEs.

Remark 4.6.20. *Segment Information*
Segment information provide insights into different lines of business and geographies.
Help investor decide whether capital is being allocated well within bank's internally competing operations.

Remark 4.6.21. *Currency Exposure*
Significant for large, global banks trading in currencies or holding significant assets or liabilities in different currencies whose values fluctuate. Volatility in currency values may have significant impact on bank earnings.

Remark 4.6.22. *Risk Factors*
Fill gaps on legal and regulatory issues, present in annual filing.

Remark 4.6.23. *Basel III Disclosures*
Provide regulatory information on consistent, comparable basis

4.6.3 Insurance Companies

Insurance has smaller proportion of cross-broader business. Insurance foreign branch required to hold assets in jurisdiction that are adequate to cover policy liabilities.
Insurance earn revenues from premium and from investment income earned on float.

Remark 4.6.24. *Properties of P&C Insurance Companies*
Premium income is the highest source of income. To diversity risk, insurers will reinsure some risks.
Policy period is very short, with premiums received at beginning of period and invested during float period.
Claim events are clearly defined, but may take a long time to emerge.
Property insurance covers protection on auto, homes, and specific assets. Casualty insurance protects against a legal liability due to occurrence of a covered event. Multiple peril policy covers both property and casualty.

Remark 4.6.25. *P&C Insurer Profitability*
Business is cyclical and price-sensitive. Price cutting drive out profitability, competition lessens and underwriting standards tighten (hard pricing period), premiums rise and insurers return to more reasonable levels of profitability (soft pricing period), attracting more entrants; cycle repeats.
Expenses include claim expense, and expense of obtaining new policy business. Direct-to-customer model has fixed cost of staffing, and agency model has variable commissions.

Remark 4.6.26. *P&C Insurer Combined Ratio*
Soft or hard pricing is driven by industry combined ratio. When ratio is low (high), it is a hard (soft) market.

$$\begin{aligned}\text{Combined Ratio} &= \frac{\text{Insurance Expenses}}{\text{Net Premiums Earned}} \\ &= \text{Underwriting Loss Ratio} + \text{Underwriting Expense Ratio}\end{aligned}$$

For single insurer, combined ratio $> 100\%$ indicates an underwriting loss.
The combined ratio is the sum of underwriting loss ratio and expense ratio.

$$\text{Underwriting Loss Ratio} = \frac{\text{Claims paid} + \Delta\text{Loss reserves}}{\text{Net premiums earned}}$$

$$\text{Underwriting Expense Ratio} = \frac{\text{Underwriting expenses including commissions}}{\text{Net premium written}}$$

Underwriting loss ratio measures relative efficiency of company's underwriting standards (if policies are priced appropriately relative to risks borne). Lower is better.
Underwriting expense ratio measures efficiency of company operations. Lower is better.
Loss reserve is an estimated value of unpaid claims, subject to management discretion in management. Downward revisions indicate conservative loss estimation. Upward revision indicates aggressive profit booking.

Remark 4.6.27. *P&C Insurer Other Profitability and Cost Ratios*

i. Loss and loss adjustment expense ratio: measure success in estimation of risk insured. Lower is better.

$$\text{Loss and loss adjustment expense ratio} = \frac{\text{Loss expense} + \text{Loss adjustment expense}}{\text{Net premiums earned}}$$

ii. Dividends to policyholders (shareholders) ratio: liquidity measure of cash outflow on account of dividends relative to premium income

$$\text{Dividends to policyholders ratio} = \frac{\text{Dividends to policyholders (shareholders)}}{\text{Net premiums earned}}$$

iii. Combined ratio after dividends (CRAD) measures total efficiency, takes into account cash satisfaction of policyholders or shareholders after consideration of total underwriting efforts.

$$\text{Combined ratio} = \text{Loss and loss adjustment expense ratio} + \text{Underwriting expense ratio}$$
$$\text{CRAD} = \text{Combined ratio} + \text{Dividends to policyholders ratio}$$

iv. Industry specific cost ratios include:

$$\frac{\text{Total benefits paid}}{\text{Net premiums written and deposits}}$$
$$\frac{\text{Commissions and expenses}}{\text{Net premiums written and deposits}}$$

Remark 4.6.28. *P&C Insurer Investment Characteristics*
Investment preferred in steady-return, low-risk assets. Low-liquid assets shunned.
Concentration of assets by type, maturity, credit quality, industry, or geographical location or within single issuers should be evaluated.

$$\text{Total investment return ratio} = \frac{\text{Total investment income}}{\text{Invested assets}}$$

Computing the ratio after excluding unrealised capital gains from income provides information on importance of unrealised gains and losses to insurer's total income.

Remark 4.6.29. *P&C Insurer Liquidity Considerations*
Liquidity is important for P&C insurers as they stand ready to meet claim obligations.
To gauge liquidity of investment portfolio, look at fair value hierarchy reporting.

Remark 4.6.30. *Properties of L&H Insurance Companies*
Premium income is the highest source of income. To diversity risk, insurers will reinsure some risks.
Life insurance policies can be basic term-life (insurer makes payment if death occurs during policy period).
Other policy types include investment products attached to pure life policies.

Remark 4.6.31. *L&H Insurer Profitability*
Proportion of income from premiums, investments, and fees can vary over time and among insurers. Diversification is desirable, and premium income tends to be more stable over time relative to other sources.
Actuarial assumptions affect value of future liabilities due to policyholders; current period claim expense includes claim payments and interest on estimated liability to policyholders.
L&H insurers capitalise cost of acquiring new and renewal policies and amortise it based on actual and estimated future profits from that business. Estimates influence amount amortised in any given period. Estimates also affect value of securities and investment returns.
Mismatches between valuation approaches for assets and liabilities can distort values when interest rate changes.

Remark 4.6.32. *L&H Insurer Investment Characteristics*
L&H insurers have longer float period, hence investment returns are key component to profitability.
Large portion of investment portfolio is LT debt; duration mismatch between assets and liabilities is of concern.
Similar to P&C insurers, total investment income ratio is used to evaluate investment performance.

Remark 4.6.33. *L&H Insurer Liquidity Considerations*
Policy surrenders can be unpredictable, but liquidity needs are fairly predictable.
Liquidity measure takes ratio of investment assets (adjusted based on ready convertibility to cash) to obligations (adjusted based on assumptions about withdrawals).
Ratio is estimated under both normal market conditions and under stress conditions.
Current ratio not directly applicable, as BS do not include such classifications.

Remark 4.6.34. *Insurer Capitalisation Regulations*
No global risk-based capital requirement standard for insurers.
EU has adopted Solvency II standards.
NAIC in United States has minimum capital levels based on size and risk.

4.7 Evaluating Quality of Financial Reports

Definition 4.7.1.

i. *Earnings Quality*: high-quality earnings quality refers to a high level of earnings and is sustainable. High-quality earnings increase the value of a company more than low-quality earnings.

ii. *Reporting Quality*: assessment of information disclosed in the financial reports. Low-quality reporting impedes assessment, while high-quality earnings enable it.

		Financial Reporting Quality	
		Low	**High**
Earnings (Results) Quality	High	LOW financial reporting quality impedes assessment of earnings quality and impedes valuation.	HIGH financial reporting quality enables assessment. HIGH earnings quality increases company value.
	Low		HIGH financial reporting quality enables assessment. LOW earnings quality decreases company value.

Figure 6: Relationship between reporting quality and earnings quality.

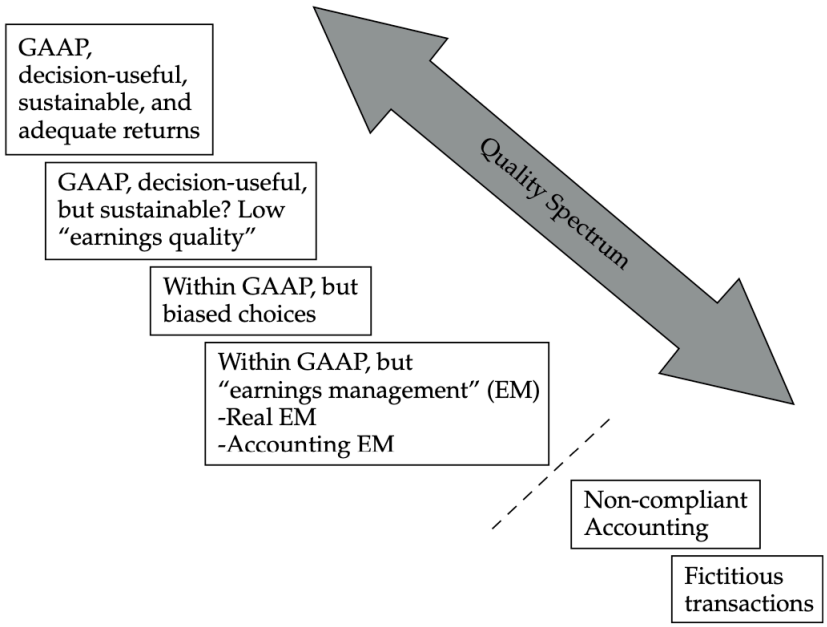

Figure 7: Quality spectrum of financial reports.

Remark 4.7.2. *Biased Accounting*
Biased accounting result in financial reports that don't faithfully represent economic phenomena. May be made in context of reported amounts and presented info.
Earnings management include smoothing of earnings to understate earnings volatility. Volatility decreased by understating earnings in well performing periods, overstated in struggling periods.

Accounting Warning Signs

Potential Issues	Possible Actions & Choices	Warning Signs
• Overstatement or non-sustainability of operating income, net income • Overstated or accelerated revenue recognition • Understated expenses • Misclassification of revenue, gains, expenses, or losses	• Contingent sales with right of return, "channel stuffing" (the practice of inducing customers to order products they would otherwise not order or order at a later date through generous terms), "bill and hold" sales (encouraging customers to order goods and retain them on seller's premises) • Fictitious (fraudulent) revenue • Capitalising expenditures as assets • Classifying non-operating income or gains as part of operations • Classifying ordinary expenses as non-recurring or non-operating • Reporting gains through net income and losses through other comprehensive income	• Growth in revenue higher than that of industry or peers • Increases in discounts to and returns from customers • Higher growth rate in receivables than revenue • Large proportion of revenue in final quarter of year for a non-seasonal business • Cash flow from operations is much lower than operating income • Inconsistency over time in the items included in operating revenues and operating expenses • Increases in operating margin • Aggressive accounting assumptions, i.e, long, depreciable lives • Losses in non-operating income or other comprehensive income and gains in operating income or net income • Compensation largely tied to financial results
• Misstatement of balance sheet items (may affect income statement) • Over- or understatement of assets • Over- or understatement of liabilities • Misclassification of assets and/or liabilities	• Choice of models and model inputs to measure fair value • Classification from current to non-current • Over- or understating reserves and allowances • Understating identifiable assets and overstating goodwill	• Models and model inputs that bias fair value measures • Inconsistency in model inputs when measuring fair value of assets com- pared with that of liabilities • Typical current assets, such as accounts receivable and inventory, included in non-current assets • Allowances and reserves that fluctuate over time or are not comparable with peers • High goodwill value relative to total assets • Use of special purpose vehicles • Large changes in deferred tax assets and liabilities • Significant off-balance-sheet liabilities
• Overstatement of cash flow from operations	• Managing activities to affect cash flow from operations • Misclassifying cash flows to positively affect cash flow from operations	• Increase in accounts payable and decrease in accounts receivable and inventory • Capitalised expenditures in investing activities • Sales and leaseback • Increases in bank overdrafts

Remark 4.7.3. *Acquisition Method Accounting*

i. Companies with decreasing cash-generating ability may acquire other companies to increase CFO; payment reported in CFI (if in cash), or not in cash flow statements if paid with equity. Consolidated CFO include CF from acquired company, concealing the acquirer's own CF issues, providing one-time boost to CFO.

ii. Acquirers making acquisition with equity may manipulate reported earnings prior to acquisition to inflate value of shares. Acquirer may also manipulate earnings upward after acquisition to positively influence opinion on the acquisition.

iii. Acquisitions may conceal previous accounting misstatements, by acquiring company that reduce comparability and consistency of financial statements, i.e., companies with less public info, less similar ops.

iv. Company may capitalise goodwill indefinitely, hence postpone recognition of an uneconomic acquisition.

Remark 4.7.4. *Compliant, but not Economic Reality*
Investor to adjust reported information to better reflect view on economic reality; if not possible as relevant data are not disclosed, may make qualitative assessment.

i. On restructuring charge, impairment charge, or combination of two, to consider whether similar events should be factored into estimated of permanent earnings (hence normalised by spreading current restructuring/impairment charges over past and current periods), or regarded as one-off items.

ii. Revisions to ongoing estimates, such as remaining economic lives of assets, may question if earlier change in estimate would have been more appropriate.

iii. Sudden increase to allowance and reserves, may question if prior estimates resulted in overstatements of prior period earnings.

iv. Large accruals for losses (i.e., environmental or litigation-related) suggest that prior periods earnings may be overstated due to failure to accrue losses earlier.

v. Significant order backlogs (disclosed in management commentary) may be used to adjust reported amounts and to prepare forecasts.

Also, to judge whether an item presented in OCI should be included in analysis as net income:

i. unrealised holding gains and losses on certain investments in equity securities,

ii. unrealised holding gains (and subsequent losses) on items of property and equipment for which the 'revaluation option' is elected (IFRS only),

iii. effects on owners' equity resulting from the translation of the foreign currency-denominated financial statements of a foreign operation to the reporting currency of the consolidated entity,

iv. certain changes to net pension liability or asset, and

v. gains and losses on derivative financial instruments (and certain foreign currency-denominated non-derivative financial instruments) accounted for as a hedge of future cash flows.

Method 4.7.5. *General Steps to Evaluate Quality of Financial Reports*

1. Develop understanding of company and its industry (economic activities, accounting principles), and assess if the accounting treatment is appropriate.
2. Evaluate company management, if any. Incentives to misreport. Review disclosures on compensation and insider transactions, related-party transactions.
3. Identify significant account areas which management judgment or unusual accounting rule is significant determinant of reported financial performance.
4. Make comparisons:
    i. Compare firm financial statement and significant disclosures in current year report with financial statements and significant disclosures in prior year report. Check for major differences in line items or in key disclosures (i.e., risk disclosures, segment disclosures, classification of specific expense, revenue items). Check if reasons for changes are apparent.
    ii. Compare firm accounting policies with closest competitors for significant differences, and direction effect of the differences.
    iii. Use ratio analysis, compare firm performance with closest competitors.
5. Check for warning sings of possible issues with quality of financial report:

i. Declining receivables turnover could suggest some revenues are fictitious, or recorded prematurely, or allowance for doubtful accounts is insufficient.
ii. Declining inventory turnover could suggest obsolescence problems
iii. Net income greater than cash provided by operations could suggest aggressive accrual accounting policies have shifted current expenses to later periods

6. Firms operating in multiple segments by geography or product (MNCs), consider if inventory, sales, and expenses have shifted to make it appear that the firm is positively exposed to a geographic region or product segment that investment community considers to be a desirable growth area. This shift may be occurring if the segment is showing strong performance while consolidated results remain static or worsen.
7. Use appropriate quantitative tools to assess likelihood of misreporting

4.7.1 Earnings Quality Analysis

Definition 4.7.6. *Beneish Model*
Probit regression model that estimate probability of earnings manipulation using eight independent variables. M-score determines the probability of earnings manipulation. Higher values indicate higher probabilities.

$$\begin{aligned}\text{M-Score} = &-4.84 + 0.920(\text{DSR}) + 0.528(\text{GMI}) + 0.404(\text{AQI}) + 0.892(\text{SGI}) \\ &+ 0.115(\text{DEPI}) - 0.172(\text{SGAI}) + 4.679(\text{Accruals}) - 0.327(\text{LEVI})\end{aligned}$$

where

i. DSR (Days Sales Receivable Index): changes in relationship between receivables and sales could indicate inappropriate revenue recognition.

$$\text{DSR} = \left(\frac{\text{Receivables}_t}{\text{Sales}_t}\right) \div \left(\frac{\text{Receivables}_{t-1}}{\text{Sales}_{t-1}}\right)$$

ii. GMI (Gross Margin Index): deterioration in margins could predispose companies to manipulate earnings.

$$\text{GMI} = \frac{\text{Gross Margin}_{t-1}}{\text{Gross Margin}_t}$$

iii. AQI (Asset Equality Index): change in percentage of assets other than in PPE and CA could indicate excessive expenditure capitalisation.

$$\text{AQI} = \left[1 - \frac{(\text{PPE}_t + \text{CA}_t)}{\text{TA}_t}\right] \div \left[1 - \frac{(\text{PPE}_{t-1} + \text{CA}_{t-1})}{\text{TA}_{t-1}}\right]$$

where PPE is property, plant, and equipment; CA is current assets; and TA is total assets.

iv. SGA (Sales Growth Index): managing perception of continuing growth and capital needs from actual growth could predispose companies to manipulate sales and earnings.

$$\text{SGA} = \frac{\text{Sales}_t}{\text{Sales}_{t-1}}$$

v. DEPI (Depreciation Index): declining depreciation rates could indicate understated depreciation as a means of manipulating earnings.

$$\begin{aligned}\text{DEPI} &= \frac{\text{Depreciation Rate}_{t-1}}{\text{Depreciation Rate}_t} \\ \text{Depreciation Rate} &= \frac{\text{Depreciation}}{\text{Depreciation} + \text{PPE}}\end{aligned}$$

vi. SGAI (Sales, General, and Administrative Expenses Index): increase in fixed SGA expenses suggests decreasing administrative & marketing efficiency, which could predispose companies to manipulate earnings.

$$\text{SGAI} = \left(\frac{\text{SGA}_t}{\text{Sales}_t}\right) \div \left(\frac{\text{SGA}_{t-1}}{\text{Sales}_{t-1}}\right)$$

vii. Accruals: higher accruals can indicate earnings manipulation.

$$\text{Accruals} = \frac{\text{Income Before Extraordinary Items} - \text{Cash from Operations}}{\text{Total Assets}}$$

viii. LEVI (Leverage Index): increasing leverage could predispose companies to manipulate earnings.

$$\text{LEVI} = \frac{\text{Leverage}_t}{\text{Leverage}_{t-1}}$$

M-score is a normally distributed random variable with mean 0 and standard deviation 1.
Probability of earnings manipulation is then cumulative probability for standard normal distribution based on the M-score. Likely cutoff is probability of earnings manipulation of 3.8% (M-score > -1.78).

Remark 4.7.7. *Limitations of Beneish Model*
Beneish model relies on accounting data, which may not reflect economic reality.
Deeper analysis of underlying relationships may be warranted to get a clearer picture.
As managers become aware of the use of specific quantitative tools, they may begin to game the measures used.

Remark 4.7.8. *Other Quantitative Models*
Other quantitative models may include variables such as accruals quality, deferred taxes, auditor change, market-to-book value, whether company is publicly listed and traded; growth rate differences between financial and non-financial variables (i.e., number of patents, employees, products); aspects of corporate governance and incentive comp.

Method 4.7.9. *Altman Model*
Model is able to assess the probability that a firm will file for bankruptcy.
Model relies on discriminant analysis to generate Z-score with five variables:

$$\frac{\text{Net Working Capital}}{\text{Total Assets}}, \frac{\text{Retained Earnings}}{\text{Total Assets}}, \frac{\text{Operating Profit}}{\text{Total Assets}}, \frac{\text{Market Value of Equity}}{\text{Book Value of Liabilities}}, \frac{\text{Sales}}{\text{Total Assets}}$$

Each variable is positively related to the Z-score, and a higher Z-score is better (less likelihood of bankruptcy). It is a single-period static model and does not capture change in key variables over time. Additionally, similar to the Beneish model, Altman's model mostly uses accounting data.

Remark 4.7.10. *Indicators of Earnings Quality*
Recurring earnings, earnings persistence and related measures of accruals, beating benchmarks, and after-the-fact confirmations of poor-quality earnings, such as enforcement actions and restatements.

Definition 4.7.11. *Non-Recurring Earnings*
Earnings from subsidiaries selected for disposal; one-off asset sales; one-off litigation or tax settlements.
Earnings with high proportion of non-recurring items less likely to be sustainable, hence considered lower quality.
Companies may disclose pro forma (adjusted) income that exclude non-recurring items; there is reconciliation between pro-forma and reported income.

Definition 4.7.12. *Classification Shifting*
Accomplished by re-classifying normal expenses to special items, or shift operating expenses to income-decreasing discontinued operations.
Does not affect total net income, can inflate the amount reported as recurring or core earnings.
Be wary of large special items or when the company is reporting unusually large operating income for a period.

Remark 4.7.13. *Persistence of Earnings*
Earnings persistence may be gauged using a regression model,

$$\text{Earnings}_{t+1} = \alpha + \beta_1 \text{Earnings}_t + \epsilon$$

where a higher β_1 would indicate higher persistence of earnings.

Method 4.7.14. *Accruals on Persistence of Earnings*
Disaggregation of income into two major components, cash and accruals, enhances its quality as an input for forecasting future earnings. Accrual component is less persistent than cash component.

$$\text{Earnings}_{t+1} = \alpha + \beta_1 \text{Cash Flow}_t + \beta_2 \text{Accruals}_t + \epsilon$$

Remark 4.7.15. *Classification of Accruals*
Accruals from normal transactions (non-discretionary) more persistent than accruals from transactions or accounting choices outside the normal (discretionary).
Outlier accruals are an indicator of possible manipulation and low quality earnings. To identify, model normal accruals then determine outliers.
Normal accruals modelled as function of economic factors (growth in credit sales and amount of depreciable assets etc.). Total accruals regressed on factors expected to give rise to normal accruals (growth of credit sales, amount of depreciable assets etc.), and residual is proxy for abnormal accruals.

Remark 4.7.16. *Signs of Possible Earnings Manipulation*

i. High magnitude of total accruals, scaled by average assets or net operating income
ii. Positive net income but negative CFO
iii. Companies repeatedly meet or barely beat consensus estimates
iv. Enforcement actions by regulatory authorities and restatements
v. Revenues from deliberate channel stuffing or bill-and-hold arrangements
vi. Relatively genuine revenues secured with heavy discounting practices may deteriorate margins
vii. Higher growth rate of receivables relative to growth rate of revenues
viii. Increasing days sales outstanding (DSO) over time
ix. Under-reporting of operating expense by capitalising it
x. Proportion of PPE increasing over time in common-size balance sheets
xi. Changes in non-current assets over time that can be explained by cost-capitalisation
xii. Stable or improving profit margins with buildup of non-current assets
xiii. Steady or rising revenues with declining asset turnover ratios

Remark 4.7.17. *Mean Reversion of Earnings*
Earnings at extreme levels tend to revert back to normal levels over time, hence extreme earnings are not expected to continue indefinitely.
When earnings are largely comprised of accruals, mean reversion will occur faster, and will be even more so when accruals are largely discretionary.

Remark 4.7.18. *Earnings Manipulation with Revenue Recognition*
Subjectivity in revenue recognition practices makes revenue highly vulnerable to manipulation.
Analyse both the quantity as well as quality of revenue. Steps in analysis of revenue recognition practices are:

i. Understand basics: shipping terms, return policies, rebates, existence of multiple deliverables etc.
ii. Evaluate and question ageing receivables: compare receivables metrics with past and industry median.
iii. Cash vs accruals: evaluate proportion of cash-based vs accruals-based earnings.
iv. Compare financials with physical data: correlate sales with capacity utilisation data etc.
v. Evaluate revenue trends and compare with peers: narrow analysis by segments.
vi. Check for related party transactions: company may artificially boost revenues by large sale with subsidiary.

Remark 4.7.19. *Earnings Manipulation with Expense Recognition*
Check if there is systematic capitalisation of expenses underway.
Steps in analysis of expense recognition practices are:

i. Understand basics: cost capitalisation policies, depreciation policies against past and peers
ii. Trend and peer analysis:
    1. Compare depreciation expense as proportion of asset size over time and with peers
    2. Compare capital expenditures to gross PPE over time and with peers
iii. Check for related party transactions: company shifting resources to privately held company owned by senior managers. Profits from related entities temporarily prop ailing public company.

4.7.2 Cash Flow Quality Analysis

Remark 4.7.20. *Indicators of Cash Flow Quality*
Startups may be expected to have negative operating and investing cash flows, funded from borrowing or from equity issuance (i.e., financing cash flows).
Established company typically have positive CFO to fund investments and return to capital providers.
High quality cash flows have the following characteristics:

i. positive CFO derived from sustainable sources
ii. CFO adequate to cover capital expenditures, dividends, debt repayments
iii. CFO with lower volatility relative to industry participants

Remark 4.7.21. *Indicators of Cash Flow Manipulation*
Management may affect cash flows via strategic decisions (timing issues). Sigs of manipulation includes:

i. significant differences between earnings and CFO, or increase in such differences
ii. shifting of positive cash flows from CFI or CFF into CFO through classification
iii. slowing of payments to suppliers (increasing accounts payables)
iv. selling receivables

Cash flow timing manipulation can be identified by activity ratios (receivables and payables turnover ratios).

Method 4.7.22. *Evaluation of Cash Flow Quality*

i. Check for unusual items or items that have not shown up in prior years
ii. Check revenue quality, aggressive revenue recognition practices (increase in receivables, inventories, reversal of sham sales)
iii. Check for strategic provisioning. Provisions for restructuring charges is an inflow (non-cash expense) in year of provision, then as outflow when ordinary operating expenses are channeled through reserves.

4.7.3 Balance Sheet Quality Analysis

Remark 4.7.23. *High Quality Balance Sheet Reporting*
Evidenced by completeness, unbiased measurement, clarity of presentation.

Remark 4.7.24. *Completeness*
Completeness is comprised of existence of off-balance-sheet obligations (purchase contracts structured as take-or-pay contracts, party is obligated to either take delivery of goods or pay penalty), may understate leverage.
Adjust reported financial statement information by constructively capitalising purchase obligations. Analyst estimates amount of obligation as the present value of future purchase obligation payments, then add the amount to company's assets and liabilities.
For inter-corporate investments, use of unconsolidated joint ventures or equity-method investees may reflect off-balance sheet liabilities. Certain profitability ratios may be overstated compared to acquisition method.
Companies consolidating several subsidiaries with close to 50% ownership using equity method case for concern.

Remark 4.7.25. *Unbiased Measurement*
Balance sheet reflects subjectivity in measurement of several assets and liabilities:

i. Value of pension liability based on several actuarial assumptions
ii. Value of investment in debt or equity securities for which market data is not readily available
iii. Goodwill value, with subjectivity in impairment testing
iv. Inventory valuation, with subjectivity in testing for impairment
v. Impairment of PPE and other assets

Overstatement of asset values (not recognising adequate impairment losses) overstates profitability and equity.

Remark 4.7.26. *Clear Presentation*
Companies have discretion on which items to present as a single-line item vs those grouped together.
Clarity of presentation allows analyst to gather relevant information and make comparisons across companies.
Clarity to be evaluated with information found in notes to financial statements and supplementary disclosures.

Remark 4.7.27. *Sources of Information about Risk*

i. Financial statements: information leverage used by company, variability of cash flows and earnings over time. Quantitative models (i.e., Altman Z-score) rely on this accounting information.

ii. Auditor's report: only historical information, hence usefulness is limited. Involuntary changes in auditors, small-sized audit firm relative to size of company being audited, lack of auditor independence are red flags.

iii. Notes to financial statements: risks related to pension benefits (actuarial assumptions), contingent obligations (description, estimated amounts, timing of payments), financial instruments (credit risk, liquidity risk, market risk).

iv. Management Discussion and Analysis (MD&A): principal risks that are unique to business.

v. SEC form 'NT': filed when firm is unable to file required reports in timely manner. Occurrence due to breakdown in accounting systems or internal controls, or discovery of misrepresentation that needs to be investigated. Filings signal problems in reporting quality.

vi. Financial press: initial information about accounting irregularities. To do own diligence to ensure information revealed has merit, and to ascertain magnitude of irregularity and impact on valuation.

4.8 Integration of Financial Analysis Techniques

Financial statement analysis framework:

Phase	Input	Output
Define purpose and context of analysis	• Perspective of analyst (i.e., evaluate debt/equity investment, issue credit rating) • Supervisor/client needs and concerns • Institutional guidelines	• Statement of purpose • Specific questions to be answered • Nature, content of final report • Timetable, resource budget
Collect data	• Financial statements • Industry/economic data • Communication with management, suppliers, customers, competitors • Company site visits (i.e., production facilities, retail stores)	• Organised financial statements • Financial data tables • Completed questionnaires
Process data	• Data from previous step	• Adjusted financial statements • Common-size statements • Ratios and graphs • Forecasts
Analyse data	• Input data and processed data	• Analytical results
Develop, communicate conclusions	• Analytical results, previous reports • Published report guidelines	• Report answering questions from first step • Recommendations
Follow-up	• Periodically-updated information	• Updated analysis and recommendations

Remark 4.8.1. *Purpose of Analysis*:

i. Sources of earnings, return on equity

ii. Asset base

iii. Capital structure

iv. Capital allocation decisions

v. Earnings quality and cash flow analysis

vi. Market value decomposition

vii. Anticipating changes in accounting standards

Remark 4.8.2. *Sources of Earnings and DuPont Equation*
DuPont decomposition allows identification of firm's performance drivers, expose effects of weaker areas of business that are masked by effects of stronger areas.

$$\begin{aligned}\text{ROE} &= \text{ROA} \times \text{Leverage} \\ &= \text{Net profit margin} \times \text{Asset turnover} \times \text{Leverage} \\ &= \text{EBIT margin} \times \text{Tax burden} \times \text{Interest burden} \times \text{Asset turnover} \times \text{Leverage} \\ &= \frac{\text{EBIT}}{\text{Revenue}} \times \frac{\text{NI}}{\text{EBT}} \times \frac{\text{EBT}}{\text{EBIT}} \times \frac{\text{Revenue}}{\text{Average assets}} \times \frac{\text{Average assets}}{\text{Average equity}}\end{aligned}$$

Consider sources of income, whether income is generated internally from operations or externally through ownership interest in an associate.
If equity income from associates or joint ventures is significant, to isolate these effects by removing equity income from DuPont analysis to eliminate bias.
Remove effects of any usual items (i.e., provisions for restructuring and litigation, goodwill impairment etc) from EBIT before computing EBIT margin and tax burden ratios.
Do not adjust financial leverage without information on how an investment asset is financed.

Remark 4.8.3. *Asset Base Composition*
Analysis of changes in composition of balance sheets over time, in a common size format.
Identify if goodwill composition increased, which indicates that a number of business acquisitions are completed.
In this case, increase in EBIT margin and ROE may be partially due to successful acquisition.

Remark 4.8.4. *Capital Structure Analysis*
Firm's capital structure must be able to support management's strategic objectives, and to allow the firm to

honour its future obligations.
Decrease of financial leverage ratio does not reveal true nature of the leverage, as some liabilities are more burdensome than others. Financial liabilities and bond liabilities are more burdensome than employee benefit obligations, deferred taxes, restructuring provisions etc.
If long-term debt has decreased, consider possibility of an offsetting change in working capital.
Analyse current ratio, quick ratio, and declining interval ratio, receivables, inventory turnover ratios etc.

Remark 4.8.5. *Capital Allocation Decisions*
Consolidated financial statements may hide individual characteristics of dissimilar subsidiaries. Hence, firms required to disaggregate financial information by segments to assist users.
Use disclosures in identifying each segment's contribution to revenue and profit, relationship between capital expenditures and rates of return, and which segments should be de-emphasised or eliminated. If following ratio is greater than one, then the firm is growing the segment by allocating a greater percentage of capital expenditures to a segment than the segment's proportion of total assets:

$$\frac{\text{Proportional capital expenditures of segment}}{\text{Proportional assets of segment}}$$

The following ratio allows determination if firm is investing its capital in its most profitable segments:

$$\frac{\text{EBIT margin contributed by segment}}{\text{Capital expenditure proportion to asset proportion of segment}}$$

Accrual-based measures such as EBIT may not be good indicator of entity ability to generate CF. Evaluate segmental capital allocation decisions based on CF generated by each segment. If segmental CF not reported, may be approximated with EBITDA. We may then compute

$$\frac{\text{EBITDA}}{\text{Average Assets}}$$

Definition 4.8.6. *Balance Sheet-Based Aggregate Accruals*

$$\begin{aligned}\text{Net operating assets (NOA)} &= \text{Operating assets} - \text{Operating liabilities}\\ &= (\text{Total assets} - \text{Cash and ST investments}) - (\text{Total liabilities} - \text{Total debt})\\ \text{Accruals}_{\text{BS}} &= \text{NOA}_t - \text{NOA}_{t-1}\end{aligned}$$

To scale the accrual measure for differences in size, as measure can be distorted if firm is growing or contracting quickly. Scaling allows for comparison with other firms.

$$\text{Accruals ratio}_{\text{BS}} = \frac{\text{NOA}_t - \text{NOA}_{t-1}}{(\text{NOA}_t + \text{NOA}_{t-1})/2}$$

Definition 4.8.7. *Cash Flow Statement-Based Aggregate Accruals*
May be derived from CFO and CFI.

$$\begin{aligned}\text{Accruals}_{\text{CFS}} &= \text{NI} - (\text{CFO} + \text{CFI})\\ \text{Accruals ratio}_{\text{CFS}} &= \frac{\text{NI} - (\text{CFO} + \text{CFI})}{(\text{NOA}_t + \text{NOA}_{t-1})/2}\end{aligned}$$

Note that net income arises from transactions associated with CFO (profits from normal operating business) and CFI (income from investments in other businesses). This allows more accurate evaluation of persistence and reliability of earnings.
For firms using GAAP, to reclassify some CFO to CFF for comparison purposes.

Remark 4.8.8. *Comparison of Both Accrual Ratios*
Although both measures are conceptually equivalent, they may differ due to acquisitions and divestitures, exchange rate gains and losses, inconsistent treatment of specific items on BS and on CFS.

Definition 4.8.9. *Cash Generated from Operations (CGO)*
Due to potential for earnings manipulation by increasing accruals, we eliminate cash paid for interest and taxes from CFO by adding them back (interest and taxes are deducted from CFO but not from operating income).

$$\text{CGO} = \text{EBIT} + \text{Non-cash charges} - \text{Increase in working capital}$$

For firms following IFRS, if interest is reported as CFF, no interest adjustment is necessary.
If CGO exceeds operating income, this reduces concerns of potential earnings manipulation.

Remark 4.8.10. *Market Value Decomposition*
If parent company has ownership interest in an associate, then determine the standalone value of the parent. Implied value of parent is parent's market value less parent's pro rata share of associate's market value. If associate's stock is traded on foreign exchange, convert to the parent's reporting currency.
We may then compute the implied PE multiple and relevant measures.

4.9 Financial Statement Modelling

Definition 4.9.1. *Bottom-Up Analysis*
Begins with analysis if individual company of its reportable segments.
Revenue projects are based on historical revenue growth or company's new product introductions.
Another approach is through balance sheet composition forecasts (i.e., interest revenue forecasts for a bank)

Definition 4.9.2. *Top-Down Analysis*
Begins with analysis on macroeconomic variable (expected growth rate of nominal GDP).
Forecasts then made at lower levels, such as sector, industry, and market for specific product, before arriving at a revenue projection for the individual company.

Definition 4.9.3. *Hybrid Analysis*
Incorporates both top-down and bottoms-up analysis.
May highlight any inconsistencies in assumptions between the two approaches.

Method 4.9.4. *Top-Down Approaches to Modelling Revenue*

i. Growth relative to GDP growth approach: relationship between GDP and company revenue is assumed to be at a rate of GDP growth rate times $1 + x\%$.
ii. Market growth and market share approach: begin with estimate of industry sales (market growth), then company revenue is estimated as percentage of industry sales (market share). Market share times estimated industry sales provide estimate of company revenues.
Different business or geographic segments may have significantly different relationships between GDP growth and revenue growth.

Method 4.9.5. *Bottom-Up Approaches to Modelling Revenue*

i. Time series: forecasts based on historical growth rates or time-series analysis
ii. Returns-based measure: based on BS accounts
iii. Capacity-based measure: based on capacity of same-store sales growth and sales related to new stores.

4.9.1 Income Statement Modelling

Remark 4.9.6. *Economies of Scale on Operating Margins and Sales Levels*
Company with economies of scale will have lower average cost, hence higher operating margin.
Observed in larger companies that have higher sales.
To evaluate if company has economies of scale, look at common-size IS.
Economies of scale in COGS are evidenced by lower COGS as proportion of sales. Lower SG&A as a proportion of sales is also evidence of economies of scale.

Remark 4.9.7. *Forecast of COGS*
As COGS is closely related to revenue, COGS is estimated as percentage of future revenue.

$$\text{Forecast COGS} = \frac{\text{Historical COGS}}{\text{Historical revenue}} \times \text{Forecast revenue}$$
$$\text{Forecast COGS} = (1 - \text{Gross margin}) \times \text{Forecast revenue}$$

If company gross margin is on an increasing or decreasing trend (due to changes in business or market conditions), future gross margins should consider the probability of trend continuing.
To also cross check firm gross margin against competitors on if future gross margin estimates are reasonable.
More detailed analysis on volume and price improves quality of COGS forecast in the ST.
Firms with commodity as input cannot easily pass higher input costs to customers, hence will use hedging. To check for proportion of future input costs hedged this way, and if firm has historically hedged these costs.
COGS estimates improved by forecasting COGS for various product categories and business segments separately.

Remark 4.9.8. *Forecast of SG&A Costs*
SG&A costs are less sensitive to changes in sales volume as compared to COGS.
SG&A fixed cost component is generally greater than its variable cost component. Expenses for salaries, IT operations etc. are more fixed than variable in nature, and grows as the firm grows.
R&D expenditures are set by management and hence uncorrelated to revenues.
Selling and distribution costs are more correlated with sales volumes.
To break SG&A component into different components and segments for better forecasts.

Remark 4.9.9. *Financing Cost Forecast*
Primary factors of gross interest payment are the level of (gross) debt and market interest rates.
Companies may also have interest income from payments, true for banks and other financial companies, and less so for non-financial companies such as manufacturers.

$$\text{Net debt} = \text{Gross debt} - \text{Cash, cash equivalents, other ST securities}$$
$$\text{Net interest expense} = \text{Gross interest expense} - \text{Interest income on cash and ST debt securities}$$

Include planned debt issuance or retirement and maturity of structure of existing debt (disclosed in footnotes to financial statements) to improve forecasts of future financing costs.

Remark 4.9.10. *Types of Tax Rates*

i. Statutory rate: percentage tax charged in country where firm is domiciled
ii. Effective tax rate: income tax expense as percentage of pretax income on IS
iii. Cash tax rate: cash taxes paid as percentage of pretax income

Remark 4.9.11. *Income Tax Expense Forecast*
Changes in deferred tax items account for difference between income tax expense and cash taxes due. Note,

$$\text{Income tax expense} = \text{Cash tax due} + (\Delta\text{Deferred tax liabilities} - \Delta\text{Deferred tax assets})$$

Reconciliation of difference between statutory and effective tax rates is in footnotes to financial statements, and can provide information on one-time events, and tax rates for various jurisdictions in which the firm operates.
Statutory and effective tax rates may differ due to:

i. Expenses recognised in IS that are not deductible for tax purposes (permanent difference)
ii. Company with higher (lower) earnings growth in high tax country will have higher effective tax rate.

Pay attention to estimates of tax rates for companies that consistently report an effective tax rate less than statutory rate, or consistently less than that of comparable peer companies.

Remark 4.9.12. *Other Items Forecast*
Dividends estimated based on historical data, using constant growth rate, or constant payout ratio.
Forecast of number of shares outstanding due to share repurchases and issuances require analysts to pay attention to stated changes in capital structure.
Unusual charges to be excluded in forecasts. If company has history of such charges, then a normalised amount of such charges to be included in expense forecasts.

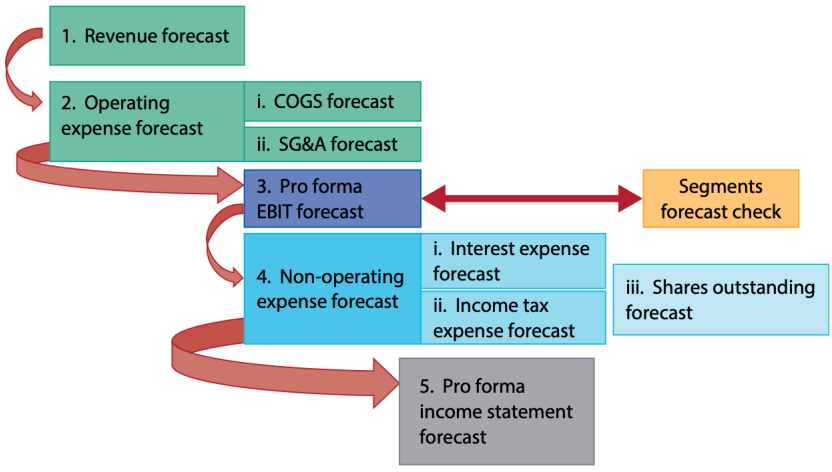

Figure 8: Income statement forecast process

4.9.2 Balance Sheet and Cash Flow Statement Modelling

Remark 4.9.13. *Balance Sheet Forecast*
Items from forecast IS flow into BS items

i. Net income less dividends from IS declared will flow to retained earnings

ii. Working capital items can be forecasted based on historical relationship with IS items.

iii. $\frac{\text{Forecasted annual COGS}}{\text{Inventory turnover ratio}}$ from IS can be used to forecast inventory value consistent with IS COGS projections

iv. DSO from IS can be used to forecast

$$\text{Projected accounts receivables} = \text{DSO} \times \frac{\text{Forecasted sales}}{365}$$

Estimates derived this way will preserve working capital items relationship with IS items. Absent any complicating factors, working capital items will increase at same rate as revenues.

v. PPE on BS determined by depreciation and Capex. To estimate PPE, assume it will be equal to historical average proportion of sales, hence PPE will grow at same rate as revenue.

vi. Forecasts may be improved by info on company's operations and future plans (hence forecast future capital needs), and by analysing Capex for maintenance separately from Capex for growth.

vii. Historical depreciation to be increased by inflation rate when estimating Capex for maintenance as replacement costs can be expected to increase with inflation.

Remark 4.9.14. *Post-Forecast Analysis of Balance Sheet*
Perform sensitivity analysis for individual assumptions, or with alternative assumptions (scenario analysis), to examine sensitivity of net income to changes in assumptions.

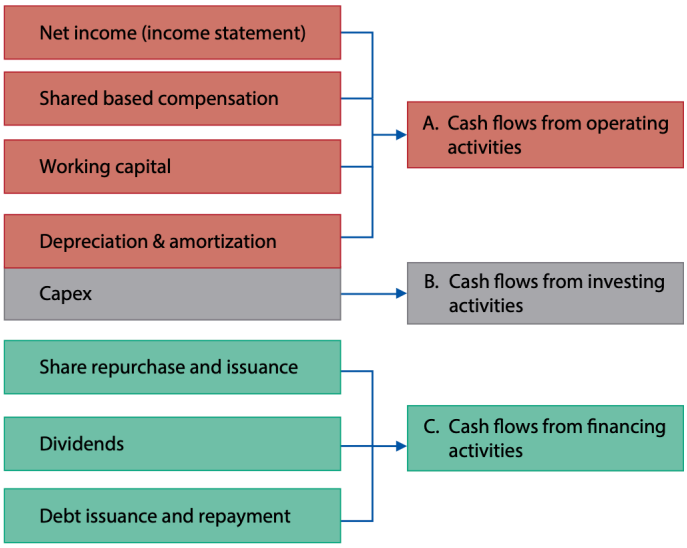

Figure 9: Cash flow statement forecast process

4.9.3 Behavioural Bias in Analysis Forecasts

Remark 4.9.15. *Overconfidence Bias*
Underestimation of forecast errors, hence a narrower confidence interval for forecasts than warranted.
Evaluate efficacy of past forecasts and learn from previous forecasting errors.
Scenario analysis may help identify shortcomings.

Remark 4.9.16. *Illusion of Control Bias*
False sense of security in one's forecast. Bias is manifested when:

i. expert opinion are used to justify a forecast

ii. making a model more complex and granular (by adding more independent variables).

Overfitted models perform poorly out of sample, conceal assumptions not updated based on new information. Mitigated by focusing only on variables with known explanatory power, and by seeking outside opinions only from those with unique or specific perspective.

Remark 4.9.17. *Conservatism Bias (Anchoring)*
Only small adjustments are made to prior forecasts when new information becomes available.
Results in reluctance to incorporate new negative information, and lags in incorporating positive information.
Mitigation requires periodic evaluation of forecasting errors, using more parsimonious models.

Definition 4.9.18. A phenomenon's rate of incidence in a larger population is the *base rate*.
Focus on base rate (viewing the company as member of particular industry) is the 'outside view', while situation-specific view (fixating on firm's company specific factors is the 'inside view'.

Remark 4.9.19. *Representativeness Bias*
Occurs due to tendency to classify data based on past information and known classifications.
New information may only be superficially similar to a known classification, hence best viewed from a fresh perspective. One common form of the bias is the base-rate neglect, where an observation's membership (its base rate) is neglected in favour of situation or member-specific information.
To consider both inside and outside view to generate forecasts.

Remark 4.9.20. *Confirmation Bias*
Causes analyst to seek out or pay attention to data that affirms their earlier convictions, and to disregard or underestimate information that disputes those opinions.
To reduce bias, keep abreast of research from analysts with opposite views, or seek out points of view from colleagues with no emotional investment.
To recognise inherent biases while evaluating management representations.

4.9.4 Competitive Analysis and Growth Rate

Definition 4.9.21. *Return on Invested Capital (ROIC)*
ROIC is a return on both equity and debt, allows comparisons across firms with different capital structures.

$$\text{ROIC} = \frac{\text{Net operating profit adjusted for taxes (NOPLAT)}}{\text{Invested capital}}$$
$$\text{Invested capital} = \text{Operating assets} - \text{Operating liabilities}$$

Firms with higher ROIC relative to peers are likely exploiting some competitive advantage in production and/or sale of their products.

Remark 4.9.22. *Porter's Five Forces*
Industry characteristics may affect future financial results and financial forecasts.

i. Threat of substitute products: less pricing power when threat is high and switching costs are low
ii. Intensity of industry rivalry: less pricing power when intensity is high. Pricing power is low when industry concentration is low, fixed costs and exit barriers are high, industry growth is slow or negative, products are not differentiated to a significant degree
iii. Bargaining power of suppliers: prospects for earnings growth lower when bargaining power is high. If suppliers are few, able to extract a larger portion of any value added
iv. Bargaining power of customers: less pricing power when bargaining power is high, when small number of customers are responsible for large proportion of firm's sales, and when switching costs are low
v. Threat of new entrants: more pricing power and better prospects for earnings growth when threat is low. Significant barriers to entry allows existing companies to maintain high returns on invested capital

Remark 4.9.23. *Sales Projections with Inflation and Deflation*

i. Industry sales: most increases in costs (i.e., commodities or labour) will result in higher prices for end-products. Industry structure is important in determining the relationship between increases in input costs and increase in price of end products.
If demand is price elastic, company's effort to pass on inflation with higher prices can have negative impact on volume if cheaper substitutes are available. In inflationary environment, raising prices too late will squeeze profit margin, and acting too soon will result in volume loss. In deflationary environment, lowering prices too soon will result in lower price margin, waiting too long will result in volume loss.
ii. Company sales: revenue projections are based on expected volume and price development.
Revenue forecast with inflation requires input of price elasticity of the products, different rates of cost inflation in active countries, and likely inflation in costs relevant to individual product categories.

Remark 4.9.24. *Cost Projections with Inflation and Deflation*

i. Industry costs: inputs for modelling includes purchasing practices, expected input price fluctuations, use of long-term contracts or hedges. To monitor the underlying drivers of input prices as well.
Impact of inflation or deflation on industry cost structure depends on its competitive environment, i.e., if participants in industry have access to alternative inputs or are vertically integrated.

ii. Company costs: segment cost structure by category and geography. For each item of cost, the assessment of impact on potential inflation and deflation in input prices should take into account company's ability to substitute cheaper alternative for expensive inputs, or increase efficiency to offset the impact of inflation.

Remark 4.9.25. *Technological Developments*
Advanced in technology decreases cost of production; increase profit margin, industry supply and unit sales.
There may also be improved substitutes, or wholly new products, and markets and industries are disrupted.
To model introduction of new substitutes for company's products, estimate a cannibalisation factor:

$$\text{Cannibalisation rate} = \frac{\text{New product sales that replace existing product sales}}{\text{Total new product sales}}$$

The cannibalisation factor can be different for different sales channels, and is likely to be lower for business customers than for direct purchases by customers.
Use scenario and sensitivity analysis.

Remark 4.9.26. *Considerations in Choice of Explicit Forecast Horizon*
For buy-side analyst, appropriate forecast horizon may be expected holding period of stock, considered in conjunction with the investment strategy for the stock being considered.
Highly cyclical companies are difficult to model for long time horizons.
Horizon should be long enough to incorporate business cycles.
Normalised earnings are expected mid-cycle earnings, or cyclicality are no longer affecting earnings.
Corporate events such as M&A, restructurings, should be considered temporary, and forecast benefits should be long enough that the perceived benefits of such events can be realised.

Remark 4.9.27. *Considerations in Developing Projections Beyond Short-Term Horizon*
Earnings projects beyond short-term assumed based on the trend growth rate of revenue over previous cycle.
Terminal value estimated using either relative valuation (i.e., price multiple), or DCF approach.
Ensure multiples used is consistent with estimate of company growth rate and required rate of return.
For DCF, inputs are CF or earnings measure and expected future growth rate. Expected earnings or CF to be normalised to mid-cycle value. Future growth rate to be modelled based on inflection points, which may occur due to changes in overall economic environment, business cycle stage, government regulations, and technology.

Method 4.9.28. *Steps in Development of Sales-Based Pro Forma Company Model*
To use segment information and create segment forecasts when company has business or geographical segments that differ from each other in important aspects. Use sensitivity analysis or scenario analysis to estimate range of possible outcomes and their possibilities.
Steps in developing the pro forma model is as follows:

i. Estimate revenue growth and future expected revenue (using market growth plus market share, trend growth rate, or growth relative to GDP growth)
ii. Estimate COGS (based on percentage of sales, or based on business strategy, competitive environment)
iii. Estimate SG&A (as either fixed, growing with revenue, or other estimation technique)
iv. Estimate financing costs (with interest rates, debt levels, effects of any large anticipated changes in capital expenditures or anticipated changes in financial structure)
v. Estimate income tax expense and cash taxes (using historical effective rates and trends, segment information for different tax jurisdictions, and anticipated growth in high- and low-tax segments)
vi. Estimate cash taxes, taking into account changes in deferred tax items
vii. Model the BS based on items that flow from IS (working capital accounts, i.e., accounts receivable, accounts payable, and inventory)
viii. Use depreciation and capital expenditures (for maintenance and for growth) to estimate capital expenditures and net PPE for the BS
ix. Use completed pro forma IS and BS to construct pro forma CFS

Estimation methods ca be simple or more complex. To decide on when an additional or more complex analysis is warranted, and when additional complexity in estimation method provides real benefits to forecasts.

5 Corporate Issuers

5.1 Analysis of Dividends and Share Repurchases

Definition 5.1.1. Common Terminology

i. *Ex-Dividend Date*: first date that shares trade without right to receive declared dividend for the period.

ii. *Payout Policy*: set of principles guiding cash dividends and value of shares repurchased

Remark 5.1.2. Types of Dividends

i. *Regular Cash Dividends*: distribution of cash. Firms strive for stability by increasing them slowly, refraining from any reductions. Stable or increasing dividends are signs of consistent or increasing profitability. Frequency of payment vary. US and Canadian companies typically pay quarter, European and Asian companies typically pay semiannually and annually.

ii. *Extra or Special (Irregular) Dividends*: cash dividend supplementing regular dividends, or dividend from company that normally does not pay dividends. Paid under special circumstances with expectation that dividend is not recurring, or when company has a very profitable year but does not want to commit to higher ongoing regular dividend payment. Usually used by firms in cyclical industries.

iii. *Liquidating Dividend*: paid when the company:

   1. is bankrupt, and net assets (after all liabilities are paid) are distributed to shareholders
   2. sells a portion of its business for cash, proceeds distributed to shareholders
   3. pays a dividend that exceeds accumulated retained earnings (reduces stated capital)

   Liquidating dividend is a return of capital, rather than a return on capital.

iv. *Stock Dividend*: non-cash dividend paid in form of additional shares. After payment, shareholders have more shares, and cost per shares will be lower. Shareholder proportionate ownership does not change, as each shareholder receives same percentage of stock dividend. Stock dividends are not taxed. Market price per share declines, leaving shareholders with no net gain.
   Stock dividends encourage long-term investing, hence may reduce cost of equity capital. Stock dividends also increase stock float and hence its liquidity, and decrease market price of stock to a desirable trading range that attracts more investors.
   Companies paying same regular cash dividend per share has increased their share dividend, but companies that have the same payout ratio would decrease dividend per share (dividend yield unchanged).
   Stock dividend is accounted for as transfer of retained earnings to contributed capital.

v. *Stock Splits*: similar to stock dividends but larger in size. Reverse stock splits reduce number of shares outstanding and increase price per share, used to increase market price of stock to a desirable range to attract institutional investors and mutual funds that shun low-priced stocks.

Remark 5.1.3. *Effects of Dividends on Financial Statement and Ratios*
Cash dividend payments reduce cash and stockholders equity, resulting in lower quick ratio and current ratio, and higher leverage ratios (i.e., debt-to=equity, debt-to-asset).
Stock dividends, stock splits or reverse stock splits leave the capital structure unchanged, do not affect ratios.
For stock dividend, decrease in retained earnings (corresponding to value of stock dividend) is offset by increase in contributed capital, leaving value of total equity unchanged.
Stock split or reverse stock split does not affect book value of equity and tax cost basis for shareholders.

5.1.1 Theory of Dividend Policy

Remark 5.1.4. *Dividend Irrelevance Theory*
Based on Miller and Modigliani (MM), under perfect capital market assumptions (no taxes, transaction costs, equal information), dividend policy should have no impact on cost of capital or shareholder wealth. The MM theory is based on the firm's total payout policy.
Theory is based on concept of 'homemade dividends', where an investor may tailor his own dividends irrespective of company dividend policy. If cash dividend is too large, investor may take excess cash received and buy more stock. If cash dividend is too small, investor may sell some stock to get the cash flow. Hence, combination of value of investor investment in firm and cash in hand will be the same.
In real world, market imperfections causes issues, as companies issuing new shares incurs flotation costs. Shareholders selling shares would incur transaction costs and capital gain taxes. Selling shares on periodic basis will be problematic if share prices are volatile.

Remark 5.1.5. *Dividend Preference Theory (Bird in Hand Argument)*
Even under perfect capital market assumptions, investors prefer dollar of dividends to dollar of potential capital gains from earnings as dividends are viewed as less risky.
Company that pays dividends will have lower cost of equity capital than a company that does not pay dividends, hence this should result in a higher share price.
When measuring total return, dividend yield component $\frac{D_1}{P_0}$ is less risky than growth component g.

Remark 5.1.6. *Tax Aversion Theory*
Investors prefer not to receive dividends due to higher tax rates. In the extreme, this implies investors would ant companies to have zero dividend payout ratio.
In real world, tax laws prevent companies from accumulating excess earnings; dividend payments necessary.

Remark 5.1.7. *Information Asymmetry*
Company board and management have more information compared to investors. Dividends convey credit information to investors, as dividends entail actual cash flow and are expected to continue in the future.
Companies avoid increasing dividends unless higher levels of dividends are expected to continue in the future.
Dividends will not decrease unless companies expect long-run poorer prospects of the company in the future.

Remark 5.1.8. *Dividend Initiation*
Information conveyed is ambiguous. Dividend initiation may indicate that company is optimistic about its future and is sharing its wealth with stockholders; company may also have lack of profitable investment opportunities.

Remark 5.1.9. *Unexpected Dividend Increase*
Signal that business prospects are strong, managers will share success with shareholders.
Companies with long history of dividend increases are dominant in their industries, and have high return on assets and low debt ratios.

Remark 5.1.10. *Unexpected Dividend Decrease or Omissions*
Typically negative signals that business is in trouble, management does not believe current dividend payment can be maintained. May also mean profitable investment opportunities are available, shareholders will receive greater benefit by having earnings reinvested in company.

Remark 5.1.11. *Agency Costs and Dividends as Control Mechanism*

i. Between shareholders and managers: managers have incentive to over-invest, leading to investment in some negative NPV projects which reduces stockholder wealth. To reduce agency cost, increase payout of FCF as dividends. Mature firms in relatively non-cyclical industries do not need to hoard cash, hence a higher dividend payout would be welcomed by investors, resulting in increases in stock value.

ii. Between shareholders and bondholders: when there is risky debt outstanding, shareholders may pay themselves a large dividend, leaving bondholders with lower asset base as collateral, hence resulting in wealth transfer from bondholders to stockholders. Typically resolved via provisions in bond indentures, which include restrictions on dividend payment, maintenance of certain BS ratios, etc.

Definition 5.1.12. *Taxation Methods*

i. Double taxation system: corporate pretax earnings taxed at corporate levels, then taxed again at shareholder level if distributed to taxable shareholders as dividends.

ii. Dividend imputation tax system: corporate earnings first taxed at corporate level. When earnings are distributed to shareholders as dividends, shareholders receive a tax credit (franking credit). If shareholder's marginal tax rate is higher than company's, shareholder pays the difference between the two rates.

Remark 5.1.13. *Factors Affecting Dividend Payout Policy*

i. Investment opportunities: availability of positive NPV investment opportunities and speed at which firm must react to opportunities determine amount of cash firm must keep at hand. If there are many profitable opportunities and quick reaction required, dividend payout must be low.

ii. Expected volatility of future earnings: firms tie target payout ratio to long-run sustainable earnings, are reluctant to increase dividends unless reversal is not expected in the near future.
When earnings are volatile, firms are more cautions in changing dividend payout.

iii. Financial flexibility: firms with excess cash and desire to maintain financial flexibility may use stock repurchases instead of cash dividends, which is less sticky. Having cash on hand allows flexibility to meet unforeseen operating needs and investment opportunities, which is especially important in times of crisis where liquidity is low and credit is hard to obtain.

iv. Tax considerations: depends on method and amount of tax applied on dividend payment.
For companies with favourable capital gains tax compared to dividends, high-tax-bracket investors prefer low dividend payouts, low-tax-bracket investors prefer high dividend payouts.
Lower dividend tax rate compared to capital gains do not mean companies will raise their dividend payouts.
Stockholders may not prefer higher dividend payout as:

1. taxes on dividends are paid when dividend is received, while capital gains taxes are paid only when shares are sold
2. cost basis of shares may receive step-up in valuation at shareholder's death, hence taxes on capital gains may not have to be paid at all
3. tax-exempt institutions will be indifferent between dividends or capital gains

v. Flotation costs: when company issues new shares of common stock, flotation costs of 3% to 7% is taken from amount of capital raised to pay for costs associated with issuing new stock. As retained earnings have no such fee, cost of new equity capital is always higher than cost of retained earnings.
Larger companies have lower flotation costs as compared to smaller companies.
The higher the flotation costs, the lower the dividend payout.

vi. Contractual and legal restrictions: Companies may be restricted from paying dividends by legal requirements, or by implicit restrictions due to cash needs of the business:

1. Impairment of capital rule: dividends paid cannot be in excess of retained earnings
2. Debt covenants; designed to protect bondholders. May have target for liquidity ratios and coverage ratios before a dividend can be paid

Definition 5.1.14. *Taxation Methods*

i. Double taxation system: corporate pretax earnings taxed at corporate levels, then taxed again at shareholder level if distributed to taxable shareholders as dividends.

$$\text{Effective tax rate} = \text{Corporate tax rate} + (1 - \text{Corporate tax rate})(\text{Individual tax rate})$$

ii. Split rate tax system: earnings distributed as dividends are taxes at lower rate than earnings retained. Effect is to offset the higher (double) tax rate applied to dividends at individual level.
Calculation of effective rate is similar to that under double taxation, except rate applicable would be corporate tax rate for distributed income

iii. Dividend imputation tax system: taxes paid at corporate level but are attributed to shareholder, hence all taxes are effectively paid at shareholder rate.
Shareholders deduct their portion of taxes paid by corporation from their tax return. If shareholder tax bracket is lower than company rate, shareholder receive tax credit (franking credit) equal to the difference.
If shareholder tax bracket is higher than company rate, shareholder pays the difference.
Effective tax rate on dividend is simply the shareholder's marginal tax rate.

5.1.2 Payout Policies and Share Repurchases

Method 5.1.15. *Target Payout Adjustment Model*
Model of gradual adjustment from stable dividend payout policy to target dividend payout ratio.
If company earnings are expected to increase, and current payout ratio is below target payout ratio, investor may estimate future dividends with the following:

$$\text{Expected increase in dividends} = [(\text{Expected earnings} \times \text{Target payout ratio}) - \text{Previous dividend}] \times \text{Adj Fac}$$

$$\text{Adj Fac} = \frac{1}{\text{Number of years which adjustment in dividends will take place}}$$

Remark 5.1.16. *Trends in Dividend Payout Policy*

i. In developed markets, proportion of companies paying cash dividends trend downwards over LT.

ii. Percentage of companies making stock repurchases are trending upwards in US since 1980s and in UK and EU since 1990s. Major companies in Asia (CN, JP), made substantial repurchases since 2010s.

Remark 5.1.17. Share Repurchase Methods

i. *Open Market Transactions*: most flexible, allow company to buyback shares at most favourable terms. No obligation for company to complete an announced buyback program.
US companies do not need shareholder approval for open market transactions, unlike EU companies.

ii. *Fixed-Price Tender Offer*: firm buys a predetermined number of shares at a fixed price (typically premium over current market price). Company forgoes flexibility to buy back shares quickly.
If more than desired number of shares tendered to offer, company will buyback prorated number of shares from each shareholder responding to the offer.

iii. *Dutch Auction*: tender offer where company specifies a range of prices. Identify minimum clearing price for desired number of shares that need to be repurchased. Each participating shareholder indicates price and number of shares tendered. Bids accepted based on lowest price first until desired quantity is filled. Price of last offer accepted will be price paid for all shares tendered. Can be accomplished quickly, but not as quick as tender offers.

iv. *Repurchase by Direct Negotiation*: purchase shares from a major shareholder with premium over market price. Used in greenmail scenario (hostile bidder is offered a premium to go away), also to remove a large overhang in the market that is dampening the share price. Many negotiated transactions occur at discount to market price, indicating urgent liquidity needs of the seller motivating the transaction.

Remark 5.1.18. *Financial statement Effects of Repurchases*
Repurchases made with surplus cash will decrease cash and shareholder's equity, hence increasing leverage.
After repurchase, earnings per share may increase, depending on how much cash was used.
If repurchase was financed with additional debt offerings, reduction in net income from (after-tax) cost of borrowed funds to be factored to determine impact on earnings per share.
If price paid for share repurchase is higher (lower) than pre-repurchase book value per share (BVPS), then BVPS will decrease (increase).
If cost of capital is greater than earnings yield (earnings-to-price ratio), then earnings dilution will result from buyback. If earnings yield is greater than after-tax cost of borrowed funds, EPS will increase.

Remark 5.1.19. *Rationales for Share Repurchases*

i. Potential tax advantages: If tax rate on capital gains is lower than tax rate on dividend income, share repurchases have tax advantage over cash dividends.

ii. Share price support/signalling: share repurchase signals to market that company views its own stock as a good investment and the future outlook is good, and is important in presence of asymmetric information. Tactic is often used when share price is declining, and management wants to convey confidence.

iii. Added flexibility: as paying cash dividend and repurchasing shares are economically equivalent, company could declare small stable dividend, then repurchase shares with leftover earnings. Managers have discretion with respect to market timing of their repurchases.

iv. Offsetting dilution from employee stock options: offset EPS dilution from exercise of employee options.

v. Increasing financial leverage: if funded by new debt. May change company's capital structure towards a more optimal one by decreasing the percentage of equity.

Remark 5.1.20. *Dividend Safety*
Metric used to evaluate probability of dividends continuing at the current rate for a company.
Traditional ratios such as dividend payout ratio, or its inverse (dividend coverage ratio) are typically used for this purpose. A higher than normal payout ratio indicates a higher probability of dividend cut.
Compare the computed ratio to average ratio for the industry and market within which a company operates. Stable or increasing dividends are more favourable.
FCFE Coverage Ratio may also be considered, where dividends and share repurchases are both considered:

$$\text{FCFE Coverage Ratio} = \frac{\text{FCFE}}{\text{Dividends} + \text{Share repurchases}}$$

FCFE coverage ratio significantly less than one is considered unsustainable, as company is drawing down its cash reserves for dividends and repurchases.

5.2 ESG Considerations in Investment Analysis

Definition 5.2.1. Types of Ownership:

i. *Dispersed Ownership*: numerous shareholders, none have ability to individually exercise controls

ii. *Concentrated Ownership*: an individual or group with ability to exercise control

Remark 5.2.2. Degree of Control:
Degree of share ownership is not reliable indicator of concentration of control.

i. *Horizontal Ownership*: companies with mutual business interests (i.e., key customers or suppliers) have cross-holding share agreements with each other. Facilitate strategic alliances and long-term relationship.

ii. *Vertical Ownership*: company or group that has control in two or more holding companies, which in turn have controlling interests in various operating companies.

Dual-class shares may give one class of shareholder superior voting rights, another class with fewer voting rights.

Remark 5.2.3. *Conflicts with Different Ownership Structures*

i. Dispersed ownership, dispersed voting power: weak shareholders, strong managers. Principal-agent conflict likely; shareholders want value maximised, managers use firms resources to own advantage. Mitigated with presence of controlling shareholders.

ii. Concentrated ownership, concentrated voting power: strong shareholders, weak managers. Control of board of directors, effectively control and monitor management. Principal-principal conflict; controlling owners take advantage of firm resources to detriment of minority owners.

iii. Dispersed ownership, concentrated voting power: controlling shareholders gain control over minority shareholders with pyramid structures or dual-class shares. Controlling shareholders monitor management.

iv. Concentrated ownership and dispersed voting power: presence of voting caps, where voting rights of large share positions are restricted. Sovereign countries may enact this to discourage foreign investors from taking controlling position in a company belonging to an industry considered important.

Remark 5.2.4. *Types of Influential Shareholders*

i. Banks: if bank is both lender and shareholder to a firm, may use influence to encourage firm to take out expensive loans from the bank. Corporate governance controls to ensure bak does not take advantage of its role as lender at expense of other shareholders.

ii. Families: one family controlling multiple companies through interlocking directorates (individual to sit on boards of numerous companies). Principal-agent issues reduced, but difficult to recruit quality outsiders for management. Lack of concern for minority shareholders, minimal transparency and low accountability.

iii. State-Owned Enterprises (SOE): partly owned by government and trades on exchange. Seek to provide social benefits to public rather than focusing only on shareholder value maximisation.

iv. Institutional Investors: can represent large portion of equity ownership, wield shareholder rights with expertise because of their experience and resources. Typically pressure firm's management and board to act in the interest of shareholders.

v. Group Companies: achieve outsized amount of control through cross-holding of shares via vertical and horizontal ownership. Difficult for outsiders to acquire shares, increases potential for firms to participate in related-party transactions that do not advantage minority shareholders.

vi. Private-Equity Firms: may bring beneficial changes to portfolio firm's corporate governance, i.e., performance-based compensation for managers, addition of corporate codes.

vii. Foreign Investors: demand greater accountability and transparency, especially in emerging markets. Minority shareholders benefit when company decides to cross-list its shares in a country that has greater protection for investors and higher levels of transparency.

viii. Mangers and Board Directors: interests more aligned with those of other shareholders, more likely to use firm's resources to boost profitability over long term. Potential for insiders to use their ownership to protect own interests instead of other shareholders.

Remark 5.2.5. *Effect of Ownership Structure on Corporate Governance*

i. Director Independence: directors wth no material ownership with the company with regard to employment, ownership, or renumeration. Important in countries with dispersed ownership, where principal-agent problem is greater, hence board monitoring of managers is key. Portion of independent directors on boards has increased in aftermath of corporate scandals.

ii. Board Structures: either one-tier board (internal and external directors), or two-tier board (management board overseen by supervisory board). Supervisory board determine management compensation, supervising external auditors, reviewing financial records. Stakeholder representatives may sit on board.

iii. Special Voting Arrangement: advantage for minority shareholders to act on board nomination and election

iv. Corporate Governance Codes, Laws, Listing Requirements: some countries have national corporate governance codes, or use company law or regulation, stock exchange listing requirements to require firms to adopt best practices or explain why they have not

v. Stewardship Codes: voluntary codes that encourage investors to exercise legal rights and increase their level of engagement in corporate governance. In UK, the code includes a duty for institutional investors to monitor their invested companies.

Remark 5.2.6. *Effectiveness of Board Policies and Practices*

i. Structure of Board of Directors: Analyse on whether the board is appropriate in light of its accountability to shareholders, and its oversight and representation. CEO duality occurs when the chairperson of the board is also CEO; raises concerns that chairperson's oversight and monitoring may not be effective.

ii. Board Independence: majority of board members should be independent; this prevent management from self-serving behaviour, and lowers investor perceptions of risk.

iii. Board Committee: to consider if key committees reporting to financial reporting, management selection, and compensation are sufficiently independent.

iv. Skills and Experience of Board: board members to have industry-specific experience and skills, and have board expertise needed to function efficiently in board member role. Board members also to have some previous exposure to concerns on ESG risks. Long-tenured board member will have strong knowledge of operations of the firm's management and business operations, but may be resistant to beneficial change.

v. Composition of Board: small, diverse board is more effective. Diversity refers to characteristics such as age, gender, length of tenure, education, culture, and place of birth.

vi. Other Board Evaluation Considerations: boar structure and committees, culture of the board, interaction with management, its effectiveness, and its leadership.

Remark 5.2.7. *Executive Compensation*
To have executive compensation tied to KPIs.

i. Clawback Policies allow firm to reclaim past compensation if inappropriate conduct comes to light later.

ii. Say-on-pay rules gives stakeholders the opportunity to vote on executive compensation.

Remark 5.2.8. *ESG-Related Risks and Opportunities*

i. Materiality and Investment Horizon: to evaluate the materiality (impact on company operations, financial performance, valuation of securities) of underlying data. Also to consider the investment horizon and holding period when deciding ESG factors to consider in the analysis.

ii. Relevant ESG-Related Factors: to determine which ESG specific factors are most relevant to the particular industry and firm. Approaches to identify company ESG factors include:

1. ESG Data Providers: provides information in form of rankings, scores, and quantitative analysis.
2. Industry Organisations: not-for-profit groups providing information on ESG factors, which includes IIRC, SASB. These organisations work to promote standardised corporate disclosures of ESG issues.
3. Proprietary Methods: own judgment and tools used to research ESG data from published reports, government organisations, and other sources. Company-specific ESG data gathered from annual reports, corporate citizenship or sustainability reports, proxy reports, regulatory filings.

Remark 5.2.9. *ESG Security Analysis*

i. Fixed Income Analysis: focus on ESG factor downside risk ad on stranded assets. Effect of lawsuit on credit ratios, cash flow, liquidity are considered.

ii. Equity Analysis: both upside and downside impact are factored. Involves forecasting financial metrics and ratios, adjusting valuation model variables, using sensitivity and/or scenario analysis.

iii. Green Bond: fixed income, used to fund projects related to environment. Same recourse, credit ratings as issuer's other bonds, with intended use of proceeds. Valuation similar to conventional bond, except with a price premium. Concern of greenwashing.

Figure 10: ESG Integration Framework

5.3 Cost of Capital

Recall that the weight average cost of capital (WACC) is as follows:

$$\text{WACC} = w_e r_e + w_p r_r + w_d r_d (1 - t)$$

where r_e is cost of equity, r_p cost of preferred equity, r_d cost of debt, and w_e, w_r, w_d cost of weights. Consider the after-tax cost of debt if interest expense is tax-deductible, using the marginal tax rate.

Remark 5.3.1. Top-down factors that impact cost of capital are as follows:

i. *Capital Availability*: if economy has greater availability of capital, the cost will be lower. Developed economies with established, liquid capital markets, more stable currencies, better protection and law will have lower cost of capital. In some less-developed markets with lack of corporate debt markets, companies rely on other means for funding, such as bank loans or shadow banking system.

ii. *Market Conditions*: lower expected inflation lead to lower nominal risk-free rates. Risk premiums on debt and equity decrease during economic expansions, and increase during economic contractions. Transparent and predictable monetary policies lead to lower risk premiums and interest rates. Higher currency volatility leads to higher risk premiums for risk-averse investors.

iii. *Legal and Regulatory Considerations, Country Risk*: countries that follow common law-based legal systems have stronger legal systems, hence lower risk premiums compared to that of civil law-based legal systems.

iv. *Tax Jurisdiction*: the higher the marginal tax rate, the greater the tax benefit of using debt.

Remark 5.3.2. Bottom-up factors that impact cost of capital are as follows:

i. *Business or Operating Risk*: business with stable revenues, earnings and cash flows are less risky. Companies with higher customer concentration risk require more risk premium. Companies with higher leverage has higher volatility of earnings and cash flows require higher risk premiums. Companies with poor corporate governance, higher ESG-risk exposures will require higher risk premiums.

ii. *Asset Nature and Liquidity*: companies with higher proportion of tangible, fungible assets have higher recovery rate, hence lower risk premium. Specialised assets and intangibles do not have a ready liquid market, hence have lower recovery rate. Assets designated as collateral reduce cost of secured debt, but increase cost of other subordinated unsecured debt as their claim becomes superior.

iii. *Financial Strength and Profitability*: companies with higher profitability, higher ability to generate cash, lower leverage, have lower probability of default, hence a lower risk premium.

iv. *Security Features*: embedded call options increases current cost of borrowing for issuer, and allows company to refinance the debt at a favourable rate should if interest rates decline. Converse is true for put option. Cumulative preferred stock accumulates missed dividends when company is unprofitable, hence has lower risk premium. Common equity with inferior rights have higher costs than that of superior rights.

Revenues, Earnings, and Cash Flow Volatility	Lower	Higher
Higher stability of revenues, earnings, and cash flows	✓	
Higher revenue concentration		✓
Higher earnings predictability	✓	
Higher operating leverage		✓
Higher financial leverage		✓
Higher ESG risks		✓
Asset Nature and Liquidity	**Lower**	**Higher**
Higher proportion of fungible, tangible assets	✓	
Higher proportion of liquid assets	✓	
Financial Strength, Profitability, and Financial Leverage	**Lower**	**Higher**
Higher profitability	✓	
Higher cash flow generation	✓	
Higher interest coverage ratio, liquidity	✓	
Higher leverage ratio		✓
Security Features	**Lower**	**Higher**
Debt: call features		✓
Debt: put features	✓	
Debt: conversion feature	✓	
Preferred Equity: cumulative feature	✓	
Common Equity: inferior cash flow or voting rights		✓

Method 5.3.3. *Cost of Debt Estimation*

i. *Traded Debt*: if corporate debt is publicly traded, the yield to maturity (YTM) for longest maturity straight debt (debt with no embedded options) is the best estimate of cost of debt. If there exists shorter-term bonds that are more liquid than longest dated bond, YTM for this may be used instead.

ii. *Non-Traded Debt*: for private companies, or public companies with non-traded or illiquid debt securities. If credit rating exists, estimate YTM with matrix pricing by considering bonds of other companies with same or similar maturities and credit ratings. If credit rating does not exist, use interest coverage ratio or financial leverage ratio to deduce credit rating. Alternatively, credit spread of specific credit rating and maturity may be applied to benchmark rates.
Note, a company may have different ratings depending on debt collateral, seniority, convertibility, and other features. Hence, issuer rating may differ from issuer's individual series of debt.

iii. *Bank Debt*: determine interest on new bank debt financing for company to estimate cost of bank debt; if new bank debt is recent, then this may be good estimate of cost of debt if interest rate reflects current market conditions, and company risk profile has not changed materially since issuance.

iv. *Leases*: a finance or capital lease is an example of amortised loan, and can be used to estimate cost of borrowing. The rate implicit in the least (RIIL) is the implied cost of capital, which is IRR from:

$$\text{PV of lease payments} + \text{PV of residual value} = \text{Fair value of leased asset} + \text{Lessor's direct initial cost}$$

If present value of residual value and lessor's direct initial costs are unknown, the incremental borrowing rate (IBR) (rate on new secured loan over same term) may be used.

v. *International Considerations*: for foreign market, country risk premium is added to debt's yield. A country risk rating (CRR) may be used, which reflects risk related to economic conditions, political risk, exchange rate risk, securities market development and regulation. Country may be assigned a rating relative to benchmark country, which excess of the median interest rate relative to benchmark is the CRR.

Method 5.3.4. *Equity Risk Premium (ERP) Historical Estimates*
Approach used when reliable long-term equity return data is available. Typically calculated as mean value of difference between broad-based equity index return and a government debt return (as proxy for risk-free rate). Returns are assumed to be stationary, markets relatively efficient. Decisions to make includes:

i. Equity Index Selection: select an index that accurately represents typical returns earned by equity investors. Broad-based, market-value-weighted indexes typically chosen.

ii. Time Period: longer time period that covers multiple business cycles and variety of market conditions should be covered. Older data may not reflect current market conditions,

iii. Selection of Mean Type: arithmetic mean is easy to calculate, but is sensitive to extreme values, and overestimated the expected terminal value of wealth. Geometric mean gives outliers less weight, and estimates the expected terminal value of wealth more accurately, hence is more preferred.

iv. Selection of Risk-Free Rate Proxy: as duration of equity is long-term (infinite), long-term government bond rates is preferred as proxies for risk-free rate

Risk-Free Proxy	Advantages	Disadvantages
Short-Term Govt Bill Rate	Exact estimate of risk-free rate, assuming no default	does not closely match duration of infinite-life equity security
Long-Term Govt Bond YTM	YTM more closely match duration of infinite-life equity security	YTM not completely risk-free (unknown coupon reinvestment rates)

Remark 5.3.5. *Limitations of Historical Approach for Computing ERP*

i. ERPs are countercyclical; low during economic expansion, high during contractions. Estimates based on long time series of historical data is not representative of future ERP.

ii. Survivorship bias inflate historical estimates of ERP. Bias is in equity market data when poorly performing or defunct companies are removed from index membership.

Method 5.3.6. *Equity Risk Premium (ERP) Forward-Looking Approach*
Approach uses current information and expectations on economic and financial variables. Do not rely on assumption of stationarity, and less affected by survivorship bias.

i. Survey-Based Estimates: uses consensus of opinions from experts. Surveys tend to higher ERPs for developing markets relative to developed markets. Biased toward recent market returns.

ii. Dividend Discount Model Estimates: simplified model uses expected constant earnings growth rate (Gordon Growth Model), and solving for required return on equity yields

$$r_e = \frac{D_1}{V_0} + g$$

where V_0 is present value of future expected dividends, $\frac{D_1}{V_0}$ is expected dividend yield, g is expected earnings growth rate. Broad-based equity indexes have associated dividend yield, and year-ahead dividend D_1 may be fairly predictable. Expected earnings growth rate g may be inferred based on analyst expectations, which can be top-down or bottom-up generated forecasts.
Subtracting current risk-free rate from expected market equity return yields forward-looking ERP:

$$\text{ERP} = E\left[\frac{D_1}{V_0}\right] + E[g] - r_f$$

Constant growth model assumes constant growth rate in earnings and dividends; else an adjustment on anticipated P/E multiple expansion or contraction needs to be done. P/E increase may be due to increase in earnings growth rate or decrease in risk (vice versa).
Aggregate amount spent on buybacks by index constituent companies may be included in dividend yield to reflect total payout; consider degree to which buyback alter growth rates in earnings and dividends.
For rapidly growing economies, a three stage growth model (fast, transition, mature) may be used.

$$\text{Equity Index Price} = PV_{\text{Fast}} + PV_{\text{Transition}} + PV_{\text{Mature}}$$

The IRR from this is then the required rate of return. Subtract current risk-free rate to get ERP.

iii. Macroeconomic Model: Grinold-Kroner model is used, which decomposes ERP as follows:

$$\begin{aligned}\text{ERP} &= [\text{Dividend Yield} + \text{Capital Gains Yield}] - E[r_f] \\ &= [\text{Dividend Yield} + \text{Expected Repricing} + \text{Earnings Growth per Share}] - E[r_f] \\ &= [DY + \Delta(P/E) + i + g - \Delta S] - E[r_f]\end{aligned}$$

Factor	Symbol	Common Proxy
Expected income component	DY	Broad-based market index dividend yield
Expected growth rate in P/E	$\Delta(P/E)$	Adjust for market over or under valuation (commonly 0)
Expected inflation	i	(nominal yield − real yield) for similar maturity security
Expected growth in real EPS	g	Real GDP growth
Expected Δ% in shares outstd	ΔS	Depends on market and time period

Common approach to estimate expected inflation is to compare nominal yield on US Treasury bond to yield on equivalent inflation-protected Treasury security (TIPS):

$$i = \frac{1 + \text{YTM}_{\text{Treasury Bond}}}{1 + \text{YTM}_{\text{TIPS}}} - 1 \approx \text{YTM}_{\text{Treasury Bond}} - \text{YTM}_{\text{TIPS}}$$

Remark 5.3.7. *Limitations of Forward-Looking Approach for Computing ERP*

Factor	Symbol
Surveys	Subject to sampling and response biases, behavioural biases (recency bias, confirmation bias)
DDM	Assumes constant P/E. Adjustment on P/E to reflect multiple expansion or contraction
Macroecon	Models may have modelling errors or behavioural biases in forecasting

Method 5.3.8. *Equity Risk Premium Estimation*

i. Dividend Discount Model: for individual company, cost of equity is dividend yield plus capital gains yield.

$$r_e = \frac{D_1}{P_0} + g$$

A multi-year forecast may be built, in this case we may solve for r_e in following equation:

$$P_0 = \left[\sum_{t=1}^{n} \frac{D_t}{(1+r_e)^t}\right] + \frac{P_n}{(1+r_e)^n}$$

ii. Bond Yield Plus Risk Premium Approach (BYPRP): build-up approach for estimating cost of equity for company with publicly traded debt. To select risk premium, an average of historical difference between

equity returns and cost of debt may be used.

$$r_e = r_d + RP$$

where r_d is company cost of debt (proxied by YTM on long-term debt).

iii. Risk-Based Models: r_e is sum of compensation for time value of money and for bearing risk.

1. Capital Asset Pricing Model (CAPM): single factor model,

$$r_e = r_f + \hat{\beta}(\text{ERP})$$

where r_f is risk-free rate, $\hat{\beta}$ is company beta.
This may be estimated with market model, which replaces expected returns on company and market with actual historical returns. Let $r_{i,t}$ be equity excess returns, $r_{f,t}$ be risk-free rate, $r_{m,t}$ be excess returns of an equity market index. Then

$$(r_{i,t} - r_{f,t}) = b_0 + b_1(r_{m,t} - r_{f,t}) + \epsilon_t$$

For private companies, beta of a comparable publicly traded company may be used by after adjusting for leverage differences.

2. Fama-French Models: multi-factor model that adds two additional factors to CAPM:

$$r_e = r_f + \beta_1\text{ERP} + \beta_2\text{SMB} + \beta_3\text{HML}$$

where SMB is size premium, HML is value premium (measured by book-to-market ratio).
The five factor model adds profitability factor (robust vs weak profitability) (RMW) and investment factor (conservative vs aggressive investment) (CMA):

$$r_e = r_f + \beta_1\text{ERP} + \beta_2\text{SMB} + \beta_3\text{HML} + \beta_4\text{RMW} + \beta_5\text{CMA}$$

iv. Private Companies: as there is no market price data, CAPM and Fama-French is not suitable to be directly applied. Illiquidity, lack of transparency (no security filings and disclosures), and ownership structure with greater concentration of control, increases investment risk.
Specific-company risk premium (SCRP) reflects factors such as geographic risk, key-person risk, and other firm-specific factors that may not be easy to diversity away.

Qualitative Factors	Quantitative Factors
• The industry in which the business operates • Competitive position within the industry • Management's experience and expertise • Customer and supplier concentration • Geographic concentration of the business • Governance model of the company • Asset nature and type (tangible vs. intangible)	• Financial and operational leverage • Volatility in cash flows and earnings • Earnings predictability • Pricing power

Private company valuation also takes into account size premium (SP) and industry risk premium (IP).

1. Expanded CAPM: adds private company related risk premiums to CAPM

$$r_e = r_f + \beta_{\text{Peer}}(\text{ERP}) + \text{SP} + \text{IP} + \text{SCRP}$$

Estimate industry beta β_{Peer} from peer group of publicly traded companies in same industry. Given estimate of r_f and ERP, compute a CAPM estimate for r_e. Next, determine whether additional risk premium for company size and other company-specific risk factors are warranted, and add relevant size and company-specific risk premiums to arrive at final estimate of r_e.
SP is usually added to smaller private companies, inversely related to size of company. If lowest market-cap decile of public companies are used, then this is equal to return on average-systematic-risk micro-cap public equity issue.

2. Build-Up Approach: starts with risk-free rate, adds relevant private company premiums.

$$r_e = r_f + (\text{ERP}) + \text{SP} + \text{SCRP}$$

ERP is not beta-adjusted, as this is the required return on equity for an average-systematic-risk large-cap public equity issue.

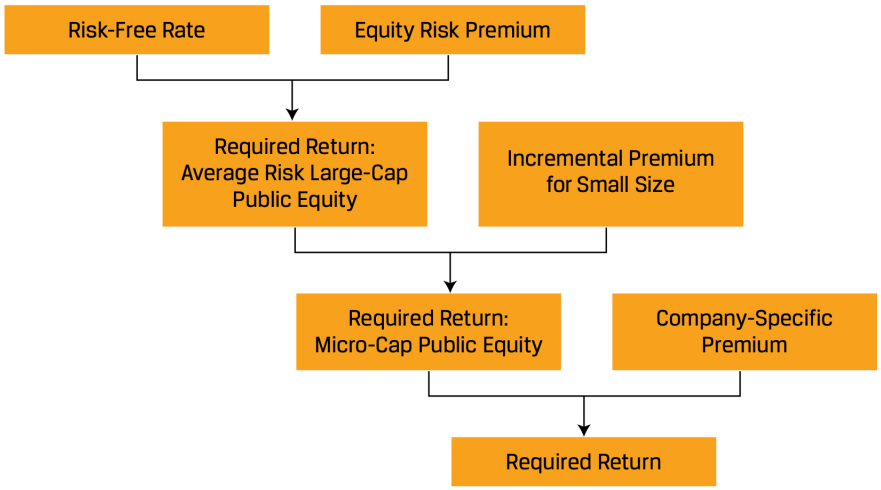

Figure 11: Build-up approach for private companies.

Approach is suitable when set of comparable public companies are unavailable or incomparable.

v. International Considerations: risks for emerging market require additional premiums.

1. Country Spread Model: additional country risk premium (CRP) is to be added. The added risk could be due to economic conditions, risk of expropriation, political risk, or other risk.

$$\text{ERP}_{EM} = \text{ERP}_{DM} + (\lambda \times \text{CRP})$$

where λ is exposure of the company to the local company.
CRP is the premium associated with anticipated greater risk of market compared to benchmark developed market. Sovereign yield spread (yield difference in EM vs DM sovereign securities) may be used; but differences in legal and market environment complicates use of just yield spreads.
Aswath Damodaran suggests adjusting the sovereign yield spread by ratio of standard deviation of country's equity and bond markets as follows:

$$\text{CRP} = \text{Sovereign Yield Spread} \times \frac{\sigma_{\text{Equity}}}{\sigma_{\text{Bond}}}$$

2. Extended CAPM: for companies operating globally, two types of models may be used. If a company operations are global, GCAPM and ICAPM may both be used; however, if operations extend to EM, methodology is less clear (estimation using sovereign yield approach might be appropriate).
Global CAPM (GCAPM): global market index is used to estimate ERP. Beta coefficient usually quite low due to low correlation between EM and DM. A second factor representing the local market is sometimes included, but availability of reliable market index data is a concern in EM.
International CAPM (ICAPM): 2 factor model based on a global market index (r_{gm}) and a foreign currency-denominated, wealth-weighted market index (r_c):

$$E[r_e] = r_f + \beta_G[E[r_{gm}] - r_f] + \beta_C[E[r_c] - r_f]$$

The first factor of ICAPM captures company relationship with local economy relative to global economy (lower β_G indicates lower integration of company with global economy). Second factor captures sensitivity of company CF to changes in its local currency value.

5.4 Corporate Restructuring

6 Portfolio Management

CFA Level 1 Materials

6.1 Fundamentals

Definition 6.1.1. *Safety-First Ratio*
Optimal portfolio minimises the probability that portfolio return R_p falls below the threshold level R_L.

$$\text{SF Ratio} = \frac{E[R_p] - R_L}{\sigma_p}$$

Note that $P(\text{Return} < R_L) = N(-\text{SF Ratio})$.

i. Calculate each portfolio's safety-first ratio.

ii. Choose the portfolio with maximum safety-first ratio.

7 Formula Sheet

7.1 Financial Ratios

References