FORMULAS : Economics

$\text{Marg. Rev} = \frac{\Delta TR}{\Delta Q}$

own price elasticity = $\frac{\text{\% change in quantity demanded}}{\text{\% change in own price}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_0}{Q_0}$

- For perfect comp
  MR = AR = P

income elasticity = $\frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$ Normal goods → +ve → P↓ Inc ↑
Inferior → -ve → P↓ Inc ↑ Q↓

- For imperfect comp
  $MR = \frac{\Delta TR}{\Delta Q} = \frac{P\Delta Q + Q\Delta P}{\Delta Q}$

cross price elasticity = $\frac{\text{\% change in quantity demanded}}{\text{\% change in price of related good}}$ → Substitute → +ve → P↑ Q
Complement → -ve

- Marginal Cost = $\frac{\text{Labor rate}}{\text{Marg. Prod}}$

- Avg. var. Cost = $\frac{\text{Total var cost}}{Q} = \frac{W}{\text{Avg. Prod}_L}$

- $MR = P\left(1 - \frac{1}{E}\right)$ ← own price elasticity

breakeven points:
perfect competition: AR = ATC
imperfect competition: TR = TC

short-run shutdown points:
perfect competition: AR < AVC
imperfect competition: TR < TVC

Profit Maximized when $\underset{\text{Short term}}{MR = MC}$ & MC is rising OR TR - TC max

nominal GDP_t for year $t = \sum_{i=1}^{N} P_{i,t}Q_{i,t}$ → Current price

$= \sum_{i=1}^{N}$(price of good i in year t)×(quantity of good i produced in year t)

real GDP for year $t = \sum_{i=1}^{N} P_{i,\text{base year}}Q_{i,t}$ → Base price

$= \sum_{i=1}^{N}$(price of good i in base year)×(quantity of good i produced in year t)

- Quantity theory of money
  → MV = PY
  M ~ Money supply
  Y ~ Expenditure (also inc)
  $\frac{M}{P}$ ~ Real money supply

GDP deflator for year t = $\frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$

$= \frac{\sum_{i=1}^{N} P_{i,t}Q_{i,t}}{\sum_{i=1}^{N} P_{i,\text{base year}}Q_{i,t}} \times 100 = \frac{\text{nominal GDP in year } t}{\text{value of year } t \text{ output at base year prices}} \times 100$

- Demand ∝ Income
  $\propto \frac{1}{\text{Int. rates}}$

GDP, expenditure approach:

$(S - I) = (G - T) + (X - M)$

GDP = C + I + G + (X − M) + Stat. discr
where:
C = consumption spending
I = business investment (capital equipment, inventories)
G = government purchases
X = exports
M = imports

- Participation (Activity) Ratio = $\frac{\text{No. of ppl in labor}}{\text{Total pop}^n \text{ of working people}}$

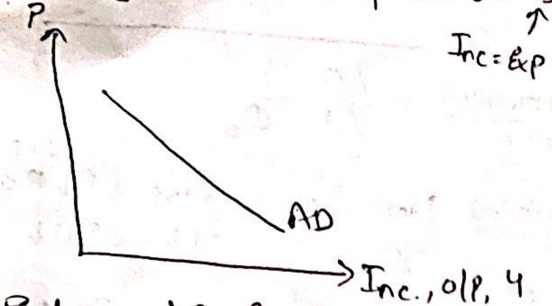
- Unemployment rate = $\frac{\text{Unemployed}}{\text{Labor force}}$

- Labor force = Working + Looking for job

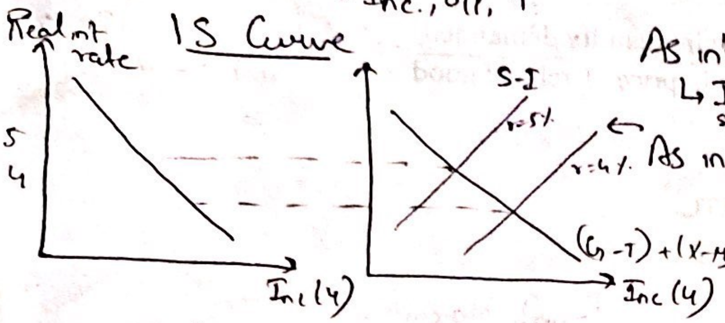
· **Agg. Demand** (Depends on IS & LM Curve)

IS: Inc = Exp

LM: Supply = Demand



IS Curve



As int. rate ↓

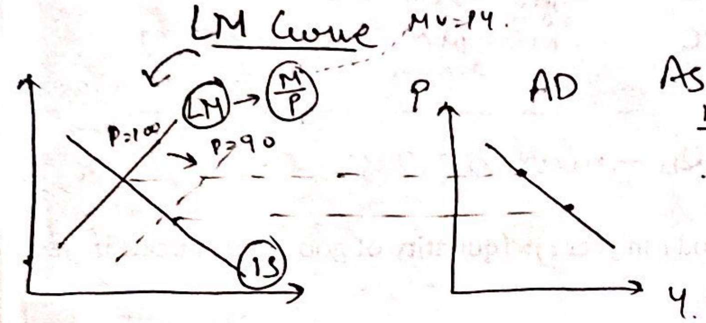
↳ Invst spn. ↑, saving ↑ ∴ (S-I) -ve

As income ↑,

I ↑, S ↑ ∴ (S-I) upward sloping

LM Curve

MV = PY.

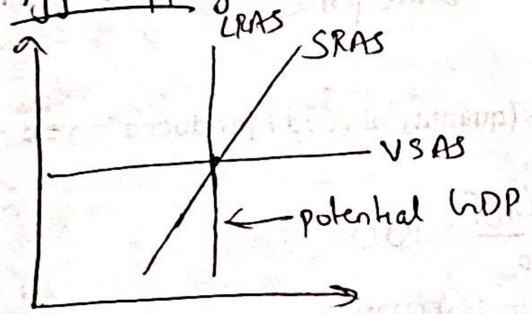


As P ↓

$\frac{M}{P}$ ↑

∴ LM shifts right

Agg Supply



approach:

national income + capital consumption allowance + statistical discrepancy

al income = compensation of employees (wages and benefits)
+ corporate and government enterprise profits before taxes
+ interest income
+ unincorporated business net income (business owners' incomes)
+ rent
+ indirect business taxes − subsidies (taxes and subsidies that are included in final prices)

personal income = national income
+ transfer payments to households
− indirect business taxes
− corporate income taxes
− undistributed corporate profits

• Potential GDP = Agg. hours worked × Labor productivity

• Labor prod. = Real GDP / Agg. hours worked

personal disposable income = personal income − personal taxes

growth in potential GDP = growth in technology + W_L(growth in labor) + W_C(growth in capital)

where:
W_L = labor's percentage share of national income
W_C = capital's percentage share of national income

growth in per-capita potential GDP = growth in technology + W_C(growth in the capital-to-labor ratio)

where:
W_C = capital's percentage share of national income

$$\text{consumer price index} = \frac{\text{cost of basket at current prices}}{\text{cost of basket at base period prices}} \times 100$$

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$$\text{money multiplier} = \frac{1}{\text{reserve requirement}}$$

* Money Created = New Deposit / Reserve Req.

equation of exchange: money supply × velocity = price × real output (MV = PY)

Fisher effect: nominal interest rate = real interest rate + expected inflation rate

neutral interest rate = real trend rate of economic growth + inflation target

Demand for money ∝ 1 / int. rate ∝ Income

* fiscal multiplier: When G↑, Y↑? how much

$$\frac{1}{1 - MPC(1 - t)}$$

where:
t = tax rate
MPC = marginal propensity to consume

Consumptn / disposable inc

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(20) * real exchange rate $\frac{P}{B}$ = nominal exchange rate $\frac{P}{B}$ (spot rate) $\times \left(\frac{CPI_{\text{base currency}}}{CPI_{\text{price currency}}}\right)$

$\frac{USD}{EUR} = 2 \approx 1EUR = 2USD$

$$\text{real exchange rate} = \frac{\text{nominal exchange rate}}{\left(\frac{CPI_{\text{price currency}}}{CPI_{\text{base currency}}}\right)}$$

forward premium (+) or discount (–) for the base currency:

$$\frac{\text{forward}}{\text{spot}} - 1$$

· Multiply int. rates by $\frac{x}{360}$ if fwd contract for x days

* interest rate parity:

$$\frac{\text{forward}_{P/B}}{\text{spot}_{P/B}} = \frac{(1 + \text{interest rate}_{\text{price currency}})}{(1 + \text{interest rate}_{\text{base currency}})}$$

* Marshall-Lerner condition: by $x^*(X+M)^* \% 1$

If $W_X \varepsilon_X + W_M(\varepsilon_M - 1) > 0$, currency depr will ↑(X−M) ↓trade def.

where:
W_M = proportion of trade that is imports
W_X = proportion of trade that is exports
ε_M = elasticity of demand for imports
ε_X = elasticity of demand for exports

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(19) · GNP = GDP − Inc of foreigners + Inc of citizens in for. country

· Terms of Trade = $\frac{\text{Price of Export}}{\text{Price of Import}}$

· Current Acct = Pvt Saving + Govt Saving − Invst

Ethics

· Ethical decision making framework

Identify → Consider → Decide & Act → Reflect

Identify
- Relevent facts
- Conflict of int
- Ethical pmc
- Stakeholders owed

Consider
- Situat^n influences
- Add^n guidance
- Alternative act^n

· Standards of Professional Conduct

Professionalism
- ↳ Knowledge of laws
- ↳ Independence & Objectivity
- ↳ Misrepresentat^n
- ↳ Misconduct

Integrity of Capital MKt
- ↳ Material non-public info
- ↳ MKt manipulat^n

Duties to clients
- ↳ Loyalty, Prudence & Care
- ↳ Fair dealing
- ↳ Suitability
- ↳ Perf. presentat^n
- ↳ Preservat^n of confid. info

Duties to Employer
- ↳ Loyalty
- ↳ Add^n Compensat arrangements
- ↳ Resp. of Supervisor

Invst analy., reco & act^n
- ↳ Comm w/ clients & prosp. clients
- ↳ Diligence & reasonable basis
- ↳ Record retent^n

Conflict of interest
- ↳ Disclosure of conflicts
- ↳ Priority of trans
- ↳ Referral fees

Resp. as CFAI member
- ↳ Conduct as participants in Pgm
- ↳ Ref. to CFAI designat^n

$$= CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \ldots + \frac{CF_n}{(1+k)^n} = \sum_{t=0}^{n} \frac{CF_t}{(1+k)^t}$$

$$\text{IRR: } 0 = CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \ldots + \frac{CF_n}{(1+IRR)^n} = \sum_{t=0}^{n} \frac{CF_t}{(1+IRR)^t}$$

• If int rate +ve
↳ Disc Payback > Payback
• Rate @ which both mutually exclusive proj's NPV are equal is called crossover

payback period = full years until recovery + $\frac{\text{unrecovered cost at the beginning of the last year}}{\text{cash flow during the last year}}$

$$PI = \frac{\text{PV of future cash flows}}{CF_0} = 1 + \frac{NPV}{CF_0}$$

Profitability index > 1 → Invest
< 1 → Dont

35 WACC = $(w_d)[k_d(1-t)] + (w_{ps})(k_{ps}) + (w_{ce})(k_{ce})$
↳ Cost of Cap / Marg. Cost of Cap

after-tax cost of debt = $k_d(1-t)$

$E(r) >$ CAPM
↳ Undervalued

cost of preferred stock = $k_{ps} = D_{ps} / P$

cost of common equity:

$$k_{ce} = \frac{D_1}{P_0} + g = \frac{D_1}{P_0(1-f)} + g$$
↳ flotat^n %

$$k_{ce} = R_f + \beta[E(R_m) - R_f]$$

k_{ce} = bond yield + risk premium
→ This is pre-tax

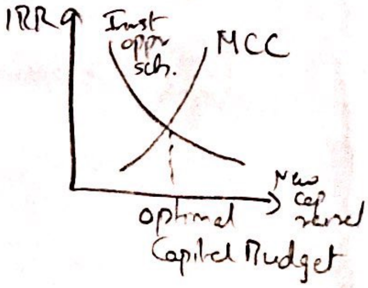
float factor = $\frac{\text{Avg daily float}}{\text{Avg daily deposit}}$

unlevered asset beta:

$$\beta_{ASSET} = \beta_{EQUITY}\left[\frac{1}{1 + \left((1-t)\frac{D}{E}\right)}\right]$$

project beta:

$$\beta_{PROJECT} = \beta_{ASSET}\left[1 + \left((1-t)\frac{D}{E}\right)\right]$$



cost of common equity with a country risk premium:

$$k_{ce} = R_f + \beta\left[E(R_{MKT}) - R_f + \text{country risk premium}\right]$$

→ Sov. yield spread × $\frac{\sigma_{\text{eq. of developing}}}{\sigma_{\text{bond of developed}}}$

break point = $\frac{\text{amount of capital at which the component's cost of capital changes}}{\text{weight of the component in the capital structure}}$

36 degree of operating leverage = $\frac{Q(P-V)}{Q(P-V)-F} = \frac{\%\Delta EBIT}{\%\Delta sales}$

F = Fixed Operating Cost
C = — " — Financing Cost

degree of financial leverage = $\frac{EBIT}{EBIT - I} = \frac{\%\Delta EPS}{\%\Delta EBIT} = \frac{Q(P-V)-F}{Q(P-V)-F-C}$

$Q(P-V)-F$ → Operating inc
$Q(P-V)-F-C$ → Opt Inc - Int

degree of total leverage = DOL × DFL = $\frac{\%\Delta EPS}{\%\Delta sales}$

* Contribut^n margin = P − V

breakeven quantity of sales = $\frac{\text{fixed operating costs + fixed financing costs}}{\text{price − variable cost per unit}}$

operating breakeven quantity of sales = $\frac{\text{fixed operating costs}}{\text{price − variable cost per unit}}$

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

$$\text{quick ratio} = \frac{\text{cash + short-term marketable securities + receivables}}{\text{current liabilities}}$$

$$\text{receivables turnover} = \frac{\text{credit sales}}{\text{average receivables}}$$

$$\text{number of days of receivables} = \frac{365}{\text{receivables turnover}} = \frac{\text{average receivables}}{\text{average day's credit sales}}$$

$$\text{inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

$$\text{number of days of inventory} = \frac{365}{\text{inventory turnover}} = \frac{\text{average inventory}}{\text{average day's COGS}}$$

$$\text{payables turnover ratio} = \frac{\text{purchases} \rightarrow \text{COGS} + \Delta\text{inv.}}{\text{average trade payables}}$$

$$\text{number of days of payables} = \frac{365}{\text{payables turnover ratio}} = \frac{\text{average payables}}{\text{average day's purchases}}$$

operating cycle = average days of inventory + average days of receivables

$$\text{cash conversion cycle} = \left(\begin{array}{c}\text{average days}\\ \text{of receivables}\end{array}\right) + \left(\begin{array}{c}\text{average days}\\ \text{of inventory}\end{array}\right) - \left(\begin{array}{c}\text{average days}\\ \text{of payables}\end{array}\right)$$

$$\%\ \text{discount} = \left(\frac{\text{face value} - \text{price}}{\text{face value}}\right)$$

$$\text{discount-basis yield} = \left(\frac{\text{face value} - \text{price}}{\text{face value}}\right)\left(\frac{360}{\text{days}}\right) = \%\ \text{discount} \times \left(\frac{360}{\text{days}}\right)$$

$$\text{money market yield} = \left(\frac{\text{face value} - \text{price}}{\text{price}}\right)\left(\frac{360}{\text{days}}\right)$$

$$= \text{holding period yield} \times \left(\frac{360}{\text{days}}\right)$$

Add-on yield

$$\text{bond equivalent yield} = \left(\frac{\text{face value} - \text{price}}{\text{price}}\right)\left(\frac{365}{\text{days to maturity}}\right)$$

$$= \text{holding period yield} \times \left(\frac{365}{\text{days}}\right)$$

Cost of not taking the disc

$$\text{cost of trade credit} = \left(1 + \frac{\%\text{discount}}{1 - \%\text{discount}}\right)^{\frac{365}{\text{days past discount}}} - 1$$

If cost trade credit > returns from fund → avail discount

where:

days past discount = number of days after the end of the discount period

If 2/10 net 40 then 40-10=30 B days past disc

$$\text{holding period return} = \frac{\text{end-of-period value}}{\text{beginning-of-period value}} - 1$$

$$= \frac{P_t + Div_t}{P_0} - 1 = \frac{P_t - P_0 + Div_t}{P_0}$$

mean return $= \dfrac{(R_1 + R_2 + R_3 + \ldots + R_n)}{n}$

metric mean return $= \sqrt[n]{(1+R_1) \times (1+R_2) \times (1+R_3) \times \ldots \times (1+R_n)} - 1$

population variance from historical data: $\sigma^2 = \dfrac{\sum_{t=1}^{T} (R_t - \mu)^2}{T}$

sample variance from historical data: $s^2 = \dfrac{\sum_{t=1}^{T} (R_t - \overline{R})^2}{T-1}$

sample covariance from historical data: $Cov_{1,2} = \dfrac{\sum_{t=1}^{n} \left\{ \left[R_{t,1} - \overline{R}_1\right]\left[R_{t,2} - \overline{R}_2\right] \right\}}{n-1}$

correlation: $\rho_{1,2} = \dfrac{Cov_{1,2}}{\sigma_1 \times \sigma_2}$

standard deviation for a two-asset portfolio:

$$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2\rho_{1,2}} \text{ or } \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2Cov_{1,2}}$$

equation of the CML: $E(R_P) = R_f + \left(\dfrac{E(R_M) - R_f}{\sigma_M}\right)\sigma_P$

$$E(R_P) = R_f + \left(E(R_M) - R_f\right)\left(\frac{\sigma_P}{\sigma_M}\right)$$

total risk = systematic risk + unsystematic risk

$\beta_i = \dfrac{Cov_{i,mkt}}{\sigma_{mkt}^2} = \rho_{i,mkt}\dfrac{\sigma_i}{\sigma_{mkt}}$

capital asset pricing model (CAPM): $E(R_i) = R_f + \beta_i[E(R_{mkt}) - R_f]$

margin call price $= P_0\left(\dfrac{1 - \text{initial margin}}{1 - \text{maintenance margin}}\right)$ aka initial equity $= \dfrac{1}{\text{leverage ratio}}$

price-weighted index $= \dfrac{\text{sum of stock prices}}{\text{number of stocks in index adjusted for splits}}$

market cap-weighted index $= \dfrac{\sum\left[(\text{price}_{today})(\text{number of shares outstanding})\right]}{\sum\left[(\text{price}_{base\ year})(\text{number of shares outstanding})\right]}$

$\times$ base year index value

preferred stock valuation model: $P_0 = \frac{D_p}{k_p}$

one-period stock valuation model: $P_0 = \frac{D_1}{1+k_e} + \frac{P_1}{1+k_e}$

infinite period model: $P_0 = \frac{D_1}{k_e - g} = \frac{D_0 \times (1+g)}{k_e - g}$

multistage model:

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \ldots + \frac{D_n}{(1+k_e)^n} + \frac{P_n}{(1+k_e)^n}$$

where:

$P_n = \frac{D_{n+1}}{k_e - g_c}$, and D_{n+1} is a dividend that will grow at the constant rate of g_c forever

earnings multiplier: $\frac{P_0}{E_1} = \frac{\frac{D_1}{E_1}}{k-g}$ → Divid payout ratio

1- dividend payout ratio

expected growth rate: g = (retention rate)(ROE)

trailing P/E = $\frac{\text{market price per share}}{\text{EPS over previous 12 months}}$

leading P/E = $\frac{\text{market price per share}}{\text{forecast EPS over next 12 months}}$

P/B ratio = $\frac{\text{market value of equity}}{\text{book value of equity}} = \frac{\text{market price per share}}{\text{book value per share}}$

where:

book value of equity = common shareholders' equity
= (total assets – total liabilities) – preferred stock

P/S ratio = $\frac{\text{market value of equity}}{\text{total sales}} = \frac{\text{market price per share}}{\text{sales per share}}$

P/CF ratio = $\frac{\text{market value of equity}}{\text{cash flow}} = \frac{\text{market price per share}}{\text{cash flow per share}}$

enterprise value = market value of common and preferred stock
+ market value of debt
– cash and short-term investments

$$\frac{\text{net inc} - \text{prf. dividends}}{\text{wt. avg. no. of common shares outstanding}}$$

Diluted EPS = $\dfrac{\text{net inc}}{\text{wt. avg. no. of common shares} + \text{New shares if conv. shares are converted}}$

- Cash paid for new equip = Ending gross equip. bal + Gross cost of equip sold − Beg. gross ep. bal

  Gross cost of equip sold ← Beg. Bal (BB) − End Bal + Equip purch.

- Cash from Sale = Historical cost of equip. sold − Depr. on Equip. sold + Gain on Sale of ep.

  Historical cost of equip. sold ← BB Ep. + EB Equip + Ep purch

  Depr. on Equip. sold ← BB of Acc Depr − EB of Acc Depr + Depr. Exp.

- Net CF from creditors = New borrowings − Principle amt repaid

- Net CF from shareholders = New Equity issued − Shares repurch. − Cash div paid

- FCFF = CFO + Int (1 − Tax Rate) − Fixed Cap. Inv

  CFO ↓ Net inc + Non cash charges − Working Cap

- FCFE = CFO + Net borrowing − Fixed Cap Inv
  = CFO − Net debt repmt − Fixed cap inv.

Scanned with CamScanner

...ios:

$OCI = CI - NI$

receivables turnover $= \dfrac{\text{annual sales}}{\text{average receivables}}$

days of sales outstanding $= \dfrac{365}{\text{receivables turnover}}$

inventory turnover $= \dfrac{\text{cost of goods sold}}{\text{average inventory}}$

days of inventory on hand $= \dfrac{365}{\text{inventory turnover}}$

payables turnover $= \dfrac{\text{purchases} \rightarrow COGS + \Delta Inv}{\text{average trade payables}}$

number of days of payables $= \dfrac{365}{\text{payables turnover ratio}}$

total asset turnover $= \dfrac{\text{revenue}}{\text{average total assets}}$

fixed asset turnover $= \dfrac{\text{revenue}}{\text{average net fixed assets}}$

working capital turnover $= \dfrac{\text{revenue}}{\text{average working capital}}$

Liquidity Ratios:

current ratio $= \dfrac{\text{current assets}}{\text{current liabilities}}$

quick ratio $= \dfrac{\text{cash + marketable securities + receivables}}{\text{current liabilities}}$

cash ratio $= \dfrac{\text{cash + marketable securities}}{\text{current liabilities}}$

defensive interval $= \dfrac{\text{cash + marketable securities + receivables}}{\text{average daily expenditures}}$

cash conversion cycle $= \left(\begin{matrix}\text{days sales}\\ \text{outstanding}\end{matrix}\right) + \left(\begin{matrix}\text{days of inventory}\\ \text{on hand}\end{matrix}\right) - \left(\begin{matrix}\text{number of days}\\ \text{of payables}\end{matrix}\right)$

Solvency Ratios:

debt-to-equity $= \dfrac{\text{total debt}}{\text{total shareholders' equity}}$

debt-to-capital $= \dfrac{\text{total debt}}{\text{total debt + total shareholders' equity}}$

Bonds payable = FV of bond + disc − prem.

$$\text{debt-to-assets} = \frac{\text{total debt}}{\text{total assets}}$$

$$\text{financial leverage} = \frac{\text{average total assets}}{\text{average total equity}}$$

$$\text{interest coverage} = \frac{\text{earnings before interest and taxes}}{\text{interest payments}}$$

Net inc + int exp + tax paid

observe the diff

$$\text{fixed charge coverage} = \frac{\text{earnings before interest and taxes} + \text{lease payments}}{\text{interest payments} + \text{lease payments}}$$

Profitability Ratios:

$$\text{net profit margin} = \frac{\text{net income}}{\text{revenue}}$$

$$\text{gross profit margin} = \frac{\text{gross profit}}{\text{revenue}}$$

$$\text{operating profit margin} = \frac{\text{operating income}}{\text{revenue}} \text{ or } \frac{\text{EBIT}}{\text{revenue}}$$

$$\text{pretax margin} = \frac{\text{EBT}}{\text{revenue}}$$

$$\text{return on assets (ROA)} = \frac{\text{net income}}{\text{average total assets}}$$

$$\text{return on assets (ROA)} = \frac{\text{net income} + \text{interest expense}(1 - \text{tax rate})}{\text{average total assets}}$$

$$\text{operating return on assets} = \frac{\text{operating income}}{\text{average total assets}} \text{ or } \frac{\text{EBIT}}{\text{average total assets}}$$

☆ $$\text{return on total capital} = \frac{\text{EBIT}}{\text{average total capital}}$$

$$\text{return on equity} = \frac{\text{net income}}{\text{average total equity}}$$

$$\text{return on common equity} = \frac{\text{net income} - \text{preferred dividends}}{\text{average common equity}}$$

$$= \frac{\text{net income available to common}}{\text{average common equity}}$$

Free Cash Flow to the Firm:

FCFF = net income + noncash charges + [cash interest paid × (1 − tax rate)] − fixed capital investment − working capital investment

FCFF = cash flow from operations + [cash interest paid × (1 − tax rate)] − fixed capital investment

Free Cash Flow to Equity:

FCFE = cash flow from operations − fixed capital investment + net borrowing

$$\text{common-size income statement ratios} = \frac{\text{income statement account}}{\text{sales}}$$

$$\text{common-size balance sheet ratios} = \frac{\text{balance sheet account}}{\text{total assets}}$$

$$\text{common-size cash flow ratios} = \frac{\text{cash flow statement account}}{\text{revenues}}$$

$$\text{original DuPont equation: ROE} = \begin{pmatrix}\text{net profit}\\ \text{margin}\end{pmatrix}\begin{pmatrix}\text{asset}\\ \text{turnover}\end{pmatrix}\begin{pmatrix}\text{leverage}\\ \text{ratio}\end{pmatrix}$$

= RoA x fin leverage

extended DuPont equation:

$$\text{ROE} = \left(\frac{\text{net income}}{\text{EBT}}\right)\left(\frac{\text{EBT}}{\text{EBIT}}\right)\left(\frac{\text{EBIT}}{\text{revenue}}\right)\left(\frac{\text{revenue}}{\text{total assets}}\right)\left(\frac{\text{total assets}}{\text{total equity}}\right)$$

$$\text{basic EPS} = \frac{\text{net income} - \text{preferred dividends}}{\text{weighted average number of common shares outstanding}}$$

diluted EPS =

$$\frac{\left[\text{net income} - \begin{matrix}\text{preferred}\\ \text{dividends}\end{matrix}\right] + \begin{bmatrix}\text{convertible}\\ \text{preferred}\\ \text{dividends}\end{bmatrix} + \begin{pmatrix}\text{convertible}\\ \text{debt}\\ \text{interest}\end{pmatrix}(1-t)}{\begin{pmatrix}\text{weighted}\\ \text{average}\\ \text{shares}\end{pmatrix} + \begin{pmatrix}\text{shares from}\\ \text{conversion of}\\ \text{conv. pfd. shares}\end{pmatrix} + \begin{pmatrix}\text{shares from}\\ \text{conversion of}\\ \text{conv. debt}\end{pmatrix} + \begin{pmatrix}\text{shares}\\ \text{issuable from}\\ \text{stock options}\end{pmatrix}}$$

Coefficients of Variation:

$$\text{CV sales} = \frac{\text{standard deviation of sales}}{\text{mean sales}}$$

$$\text{CV operating income} = \frac{\text{standard deviation of operating income}}{\text{mean operating income}}$$

$$\text{CV net income} = \frac{\text{standard deviation of net income}}{\text{mean net income}}$$

Inventories:

ending inventory = beginning inventory + purchases − COGS

FIFO COGS = LIFO COGS − (ending LIFO reserve − beginning LIFO reserve)

FIFO inv = LIFO inv + LIFO reserve (1-T)

FIFO NI = LIFO NI + ΔLIFO reserve (1-T)

FIFO Ret Earn = LIFO RE + LIFO res. (1-T)

Long-Lived Assets:

$$\text{straight-line depreciation} = \frac{\text{cost} - \text{salvage value}}{\text{useful life}}$$

$$\text{DDB depreciation} = \left(\frac{2}{\text{useful life}}\right)(\text{cost} - \text{accumulated depreciation})$$

units-of-production depreciation =

$$\frac{\text{original cost} - \text{salvage value}}{\text{life in output units}} \times \text{output units in the period}$$

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

$$\text{total useful life} = \frac{\text{historical cost}}{\text{annual depreciation expense}}$$

$$\text{remaining useful life} = \frac{\text{ending net PP\&E}}{\text{annual depreciation expense}}$$

DTL if ITE > ITP
else DTA

Def. Tax Liab
= (Carrying amt − Tax Base) x Tax Rate

Deferred Taxes:

$$\text{income tax expense} = \text{taxes payable} + \Delta\text{DTL} - \Delta\text{DTA}$$

Reported Tax Rate
= Int. exp / Pretax inc

Debt Liabilities:

interest paid = Cpn rate × Issued amt i.e. (Final Val).

$$\text{interest expense} = \left(\begin{array}{c}\text{the market rate}\\ \text{at issue (YTM)}\end{array}\right) \times \left(\begin{array}{c}\text{the balance sheet value}\\ \text{of the liability at}\\ \text{the beginning of the period}\end{array}\right)$$

amortizat of disc = int. exp − int. paid

Funded Assets
= Plan Assets − PV(est. pension obligatn)

Performance Ratios:

$$\text{cash flow-to-revenue} = \frac{\text{CFO}}{\text{net revenue}}$$

$$\text{cash return-on-assets} = \frac{\text{CFO}}{\text{average total assets}}$$

$$\text{cash return-on-equity} = \frac{\text{CFO}}{\text{average total equity}}$$

$$\text{cash-to-income} = \frac{\text{CFO}}{\text{operating income}}$$

$$\text{cash flow per share} = \frac{\text{CFO} - \text{preferred dividends}}{\text{weighted average number of common shares}}$$

ge Ratios:

$$\text{debt coverage} = \frac{\text{CFO}}{\text{total debt}}$$

$$\text{interest coverage} = \frac{\text{CFO + interest paid + taxes paid}}{\text{interest paid}}$$

$$\text{reinvestment} = \frac{\text{CFO}}{\text{cash paid for long-term assets}}$$

$$\text{debt payment} = \frac{\text{CFO}}{\text{cash long-term debt repayment}}$$

$$\text{dividend payment} = \frac{\text{CFO}}{\text{dividends paid}}$$

$$\text{investing and financing} = \frac{\text{CFO}}{\text{cash outflows from investing and financing activities}}$$

[FOR]MULAS

nominal risk-free rate = real risk-free rate + expected inflation rate

required interest rate on a security = nominal risk-free rate
+ default risk premium
+ liquidity premium
+ maturity risk premium

effective annual rate = $(1 + \text{periodic rate})^m - 1$

continuous compounding: $e^r - 1 = EAR$

$PV_{perpetuity} = \frac{PMT}{I/Y}$ · PV of annuity due = PV of ordinary annuity * (1 + I/Y)

· FV of ann. due = PV. of ord. ann. * (1+I/Y)

$FV = PV(1 + I/Y)^N$

$NPV = \sum_{t=0}^{N} \frac{CF_t}{(1+r)^t}$ → discounted at opportunity cost of capital.

general formula for the IRR: $0 = CF_0 + \frac{CF_1}{1+IRR} + \frac{CF_2}{(1+IRR)^2} + \ldots + \frac{CF_N}{(1+IRR)^N}$ → If IRR > disc rate : NPV +ve
IRR < disc rate : NPV -ve

· NPV & IRR give same results when projects are independent

bank discount yield $= \frac{D}{F} \times \frac{360}{t}$

· Time wt. return (TWR) is preferred

· Generally, TWR > MWR.

holding period yield $= \frac{P_1 - P_0 + D_1}{P_0} = \frac{P_1 + D_1}{P_0} - 1$

· In TWR, do ~~AM~~ Geometric mean only if returns for yrs are given not for quarter

effective annual yield $= (1 + HPY)^{365/t} - 1$ → Compounding

money market yield $= HPY\left(\frac{360}{t}\right) = \frac{360 \times r_{BD}}{360 - (t \times r_{BD})}$ ∴ = 2 x semi-annual disc rate

If EAY = 9%,
Bond eq yield
$= 2\left[\left[1.09\right]^{1/2} - 1\right]$
= 8.803%

population mean: $\mu = \frac{\sum_{i=1}^{N} X_i}{N}$

sample mean: $\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$

geometric mean return (R_G): $1 + R_G = \sqrt[n]{(1+R_1) \times (1+R_2) \times \ldots \times (1+R_n)}$ geometric mean ≤ Arithmetic mean.

Harmonic mean < Geometric Mean < Arithmetic Mean.

Harmonic mean ↑ dollar cost avg

Geometric Mean ↑ w/ compounding

Arithmetic Mean ↑ w/o compounding

Measures of location = Quantile + Measures of central tendency.

* harmonic mean: $\bar{X}_H = \frac{N}{\sum_{i=1}^{N}\frac{1}{x_i}}$

* weighted mean: $\bar{X}_W = \sum_{i=1}^{n} w_i X_i$

* position of the observation at a given percentile, y: $L_y = (n+1)\frac{y}{100}$

range = maximum value − minimum value

* excess kurtosis = sample kurtosis − 3

* $\text{MAD} = \frac{\sum_{i=1}^{n}|X_i - \bar{X}|}{n}$ $\sigma > \text{MAD}$

* population variance $= \sigma^2 = \frac{\sum_{i=1}^{N}(X_i - \mu)^2}{N}$,

where μ = population mean and N = number of possible outcomes

* Chebshev's Ineq. → Works for any distributⁿ
% of data that lie within K sd $\boxed{1 - \frac{1}{K^2}}$ atleast

* sample variance $= s^2 = \frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n-1}$, where $\bar{X}$ = sample mean and n = sample size

* coefficient of variation: $CV = \frac{s_x}{\bar{X}} = \frac{\text{standard deviation of x}}{\text{average value of x}}$ (Lower the better)
used to compare 2 distⁿ w/ diff means

* Sample skewness
$\frac{1}{n} \frac{\Sigma(X_i - \bar{X})^3}{s^3}$

* Sample Kurtosis
$\frac{1}{n} \frac{\Sigma(X_i - \bar{X})^4}{s^4}$
Lepto > 3
Meso = 3
Platy < 3

Sharpe ratio $= \frac{\bar{r}_p - r_f}{\sigma_p}$

* joint probability: $P(AB) = P(A \mid B) \times P(B)$

* addition rule: $P(A \text{ or } B) = P(A) + P(B) - P(AB)$

* multiplication rule: $P(A \text{ and } B) = P(A) \times P(B)$

* total probability rule:
$P(R) = P(R \mid S_1) \times P(S_1) + P(R \mid S_2) \times P(S_2) + \ldots + P(R \mid S_N) \times P(S_N)$

* Stating odds
If $P(A)$ out of B trials is odd $\frac{P(A)}{P(B) - P(A)}$ ie $\frac{A}{1-A}$

* expected value: $E(X) = \Sigma P(x_i)x_i = P(x_1)x_1 + P(x_2)x_2 + \ldots + P(x_n)x_n$

* $Cov(R_i, R_j) = E\{[R_i - E(R_i)][R_j - E(R_j)]\}$ → Range $-\infty$ to ∞

→ Variance $= \Sigma(x_i - \bar{x})^2 \cdot P(x_i)$

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$$\text{corr}(R_i, R_j) = \frac{\text{Cov}(R_i, R_j)}{\sigma(R_i)\sigma(R_j)}$$ → strength of linear relationship.

* portfolio expected return: $E(R_p) = \sum_{i=1}^{N} w_i E(R_i) = w_1 E(R_1) + w_2 E(R_2) + \ldots + w_n E(R_n)$

* portfolio variance: $\text{Var}(R_p) = \sum_{i=1}^{N}\sum_{j=1}^{N} w_i w_j \text{Cov}(R_i, R_j) = \omega_1^2 \sigma_1^2 + \omega_2^2 \sigma_2^2 + 2\omega_1 \omega_2 \sigma_1 \sigma_2 \text{corr}(1,2)$
$= \omega_1^2 \sigma_1^2 + \omega_2^2 \sigma_2^2 + 2\omega_1\omega_2 \text{Cov}(1,2)$

where $w_i = \frac{\text{market value of investment in asset } i}{\text{market value of the portfolio}}$

* Bayes' formula:

$$\text{updated probability} = \frac{\text{probability of new information for a given event}}{\text{unconditional probability of new information}} \times \text{prior probability of event}$$

$$P(B|A) = \frac{P(A|B) \cdot P(B)}{P(A)}$$

* combination (binomial) formula: ${}_nC_r = \frac{n!}{(n-r)!r!}$

ranking matters
* permutation formula: ${}_nP_r = \frac{n!}{(n-r)!}$ • Given n items, there are $\boxed{n!}$ ways to arrange them.

* Continuous Uniform Distn
$P(x_1 \le X \le x_2) = \frac{x_2 - x_1}{B - A}$

* binomial probability: $p(x) = \frac{n!}{(n-x)!x!} p^x (1-p)^{n-x}$
→ probability of 'x' successes in 'n' trials

* for a binomial random variable: $E(X) = np$; variance $= np(1-p)$

* for a normal variable:

90% confidence interval for X is $\bar{X} - 1.65s$ to $\bar{X} + 1.65s$
95% confidence interval for X is $\bar{X} - 1.96s$ to $\bar{X} + 1.96s$
99% confidence interval for X is $\bar{X} - 2.58s$ to $\bar{X} + 2.58s$

* $z = \frac{\text{observation} - \text{population mean}}{\text{standard deviation}} = \frac{x - \mu}{\sigma}$

no. of std. deviatn below the mean.

Maximize → means minimize $P(R_{portfolio} < R_{threshold})$

* $\text{SFRatio} = \frac{[E(R_p) - R_L]}{\sigma_p}$

* continuously compounded rate of return: $r_{cc} = \ln\left(\frac{S_1}{S_0}\right) = \ln(1 + \text{HPR})$ HPR > R_{cc}

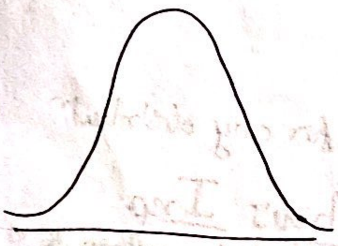
* for a uniform distribution: $P(x_1 \le X \le x_2) = \frac{(x_2 - x_1)}{(b - a)}$

· If there are K steps to complete a task & each task can be done in n ways, then no. of ways to complete the task is $n_1 \times n_2 \times n_3 \times n_4 \ldots n_K$

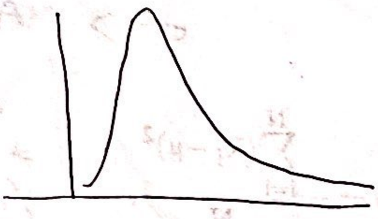
· Binomial prob. example

Consider a big bowl w/ black & white beans. Compute probab. of drawing 3 black beans. Prob. of drawing black bean is 0.6. You have chosen 5 beans.

· Normal vs Lognormal prob.



vs



For multi-normal → two distn must be dependent

Hypothesis Testing

State the hypothesis

↓

Compute test statistic → $\dfrac{\text{Sample statistic} - \text{hypothesized val}}{\text{std error of sample stat}}$

↓

Determine critical val. based on sig. level

→ Tests for single mean
t-stat / z-stat

→ Test for diff. b/n means
2 independent & normal distⁿ popⁿ

→ Test for mean of diff. (Paired comp)
dependent popⁿ.

→ Test for single var.
Chi-squared test
If dof = 23 & 5% sig. level then look @ dof 23 & 0.025 and dof 23 & 0.975 for critical values

↓

Compare test stat w/ critical val. to determine whether or not to reject null hypothesis

Type I error → Rejecting null hypo even when its true
II → Accepting ... false

$\alpha = P(\text{Type I error})$

- P-value $\propto \dfrac{1}{\text{t-stat}}$

- t-test / z-test → Mean of 1 normal distⁿ
- Diff in mean → 2 — & independent
- Mean diff → 2 — & dependent
  } critical val. using t-dist
- χ^2-test → Variance of 1
- F-test → Variance of 2

Short-int. ratio = $\dfrac{\text{No. of shares inv. sold short}}{\text{Avg. daily vol.}}$

Momentum / Rate of Change Osc (M) = $(V - V_x) * 100$ {V = last closing price}

Relative Strength Index = $100 - \dfrac{100}{1+RS}$ → $\dfrac{\text{Total price}\uparrow}{\text{Total price}\downarrow}$

%K line = $\dfrac{\text{Latest price} - \text{Low}}{\text{High} - \text{Low}}$

Arms index = $\dfrac{\text{No. of adv. issues} / \text{No. of decl. issues}}{\text{Vol. of adv issues} / \text{Vol. of decl issues}}$

≈1 → balanced
<1 → ↑ money in adv stocks → buying mood
>1 → decl. → selling

Elliot Wave theory : Fibo ratios converge to 0.618 or 1.618

hypothesized val
in stat

sampling error of the mean = sample mean − population mean = $\bar{x} - \mu$

standard error of the sample mean, known population variance: $\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$

standard error of the sample mean, unknown population variance: $s_{\bar{x}} = \dfrac{s}{\sqrt{n}}$

confidence interval: point estimate ± (reliability factor × standard error)

α = level of significance
$1-\alpha$ = degree of confid.

confidence interval for the population mean: $\bar{x} \pm z_{\alpha/2} \dfrac{\sigma}{\sqrt{n}}$ for sample

t-distⁿ

test statistic

tests for population mean = μ_0: z-statistic = $\dfrac{\bar{x}-\mu_0}{\sigma/\sqrt{n}}$, t-statistic = $\dfrac{\bar{x}-\mu_0}{s/\sqrt{n}}$

for one-tailed, use α
two-tailed, use $\dfrac{\alpha}{2}$

test for equality of variances: $F = \dfrac{s_1^2}{s_2^2}$, where $s_1^2 > s_2^2$

· Power of test = 1 − P(Type 2 err)

So if n = 30 & 90% confid interval,
for one-tailed, 29 df & α = 0.10
two , 29 df & α = 0.05 in one tailed column

paired comparisons test: t-statistic = $\dfrac{\bar{d}-\mu_{dz}}{s_{\bar{d}}}$

· p-val < sig. level → Reject H_0

test for differences in means:

t-statistic = $\dfrac{(\bar{x}_1-\bar{x}_2)}{\left(\dfrac{s_1^2}{n_1}+\dfrac{s_2^2}{n_2}\right)^{1/2}}$ (sample variances assumed unequal)

Chi-square = $(n-1)\dfrac{\text{sample var}}{\text{hypo var}}$

If you are calculating
$\bar{x}$ ± critical val * std devⁿ
for a sample,
then use $\bar{x} \pm$ critical val $* \dfrac{\sigma}{\sqrt{n}}$.

t-statistic = $\dfrac{(\bar{x}_1-\bar{x}_2)}{\left(\dfrac{s_p^2}{n_1}+\dfrac{s_p^2}{n_2}\right)^{1/2}}$ (sample variances assumed equal)

popⁿ var Known → z distⁿ
unKnown → t distⁿ

Relative Strength Analysis = $\dfrac{\text{Price of Stk}}{\text{Price of benchmk}}$

Head & Shoulders Price trgt = Neckline − (Head − Neckline)
Inv. Head & Shld. Price trgt = Neckline + (Neckline − Head)

· Central limit theorem : Sampling distⁿ's μ = Popⁿ μ
$\sigma^2 = \sigma^2/n$.

· Time Series Data : Obs taken over time & equally spaced interval
· Cross Sectional : Sample of obs taken at a single pt in time
· Longitudinal - Obs taken over time & multiple characteristics of same comp.
· Panel data - Obs over time of same characteristic of diff. entities

...MULAS

...r an annual-coupon bond with *N* years to maturity:

$$\text{price} = \frac{\text{coupon}}{(1+\text{YTM})} + \frac{\text{coupon}}{(1+\text{YTM})^2} + \ldots + \frac{\text{coupon + principal}}{(1+\text{YTM})^N}$$

for a semiannual-coupon bond with *N* years to maturity:

$$\text{price} = \frac{\text{coupon}}{\left(1+\frac{\text{YTM}}{2}\right)} + \frac{\text{coupon}}{\left(1+\frac{\text{YTM}}{2}\right)^2} + \ldots + \frac{\text{coupon + principal}}{\left(1+\frac{\text{YTM}}{2}\right)^{N\times 2}}$$

· $PV_{full} = PV_{flat} + AI$

· PV_{full} = PV of the bond $\times (1+\text{YTM})^{t/T}$

· $AI = \frac{\text{time since last cpn pmt till settl. date}}{T \text{ (i.e. 360)}} \times$ cpn pmt

bond value using spot rates:

$$\text{no-arbitrage price} = \frac{\text{coupon}}{(1+S_1)} + \frac{\text{coupon}}{(1+S_2)^2} + \ldots + \frac{\text{coupon + principal}}{(1+S_N)^N}$$

full price between coupon payment dates:

(Bond value at last coupon date based on the current YTM) × $(1+ \text{YTM}/\#)^{t/T}$

where # is the number of coupon periods per year, *t* is the number of days from the last coupon payment date until the date the bond trade will settle, and *T* is the number of days in the coupon period.

· Coupon rate = Cpn rate − L × LIBOR
if 0 < L < 1 → unleveraged

flat price = full price − accrued interest

$$\text{current yield} = \frac{\text{annual cash coupon payment}}{\text{bond price}}$$

· simple yield = $\frac{\text{sum of annual cpn pmt} \; \overset{+}{(-)} \; \text{st. line disc (prem.)}}{\text{flat price}}$

forward and spot rates: $(1 + S_2)^2 = (1 + S_1)(1 + 1y1y)$

option-adjusted spread: OAS = Z-spread − option value

· Single month mortality = $\frac{\text{Prepmt for a month}}{\text{Beg. mort. bal for month} - \text{Sched. prmc paymt for month}}$

$$\text{modified duration} = \frac{\text{Macaulay duration}}{1 + \text{YTM}}$$

approx % change in bond price = −ModDur × ΔYTM

· MacDur = PV wt avg of PV of all cash flows

$$\text{approximate modified duration} = \frac{V_- - V_+}{2V_0\Delta\text{YTM}}$$

· MacDur for non-callable perpetual bond = $\frac{1+r}{r}$ ← YTM

$$\text{effective duration} = \frac{V_- - V_+}{2V_0\Delta\text{curve}}$$

money duration = annual modified duration × full price of bond position

money duration per 100 units of par value =

annual modified duration × full bond price per 100 of par value

price value of a basis point: $PVBP = [(V_- - V_+) / 2]$

· Loss severity = 1 − Recov. Rate

Exp. loss = Default risk × Loss severity

$$\text{approximate convexity} = \frac{V_- + V_+ - 2V_0}{(\Delta\text{YTM})^2 V_0}$$

$$\text{approximate effective convexity} = \frac{V_- + V_+ - 2V_0}{(\Delta\text{curve})^2 V_0}$$

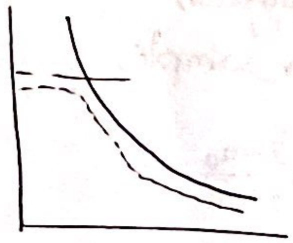
· Floating Rate Notes

Use LIBOR + Quoted Mrgin for cpn rate

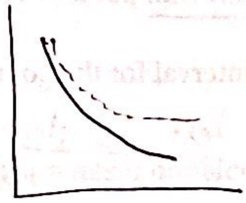
LIBOR + Req. Mrgin for FRN to return to par val

· Effective Convexity

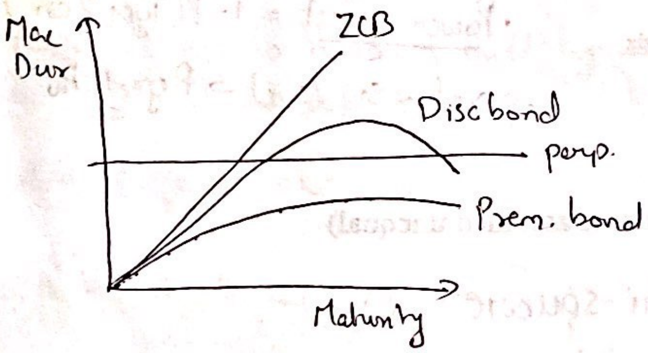
Callable bonds → -ve when YTM < cpn rate



Putable bonds → Always +ve



· MacDur



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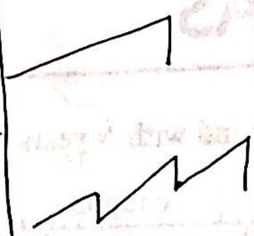
	Price	Value
Fwd	$S_T(1+r)^T$	0 @ init^n
Futures	+ve correlat^n w/ int rate	↑ along the way
Swaps	fixed rate	PV (of cash flows)



<u>Swaps</u>

$\text{You} \underset{\text{Floating}}{\overset{\text{Fixed}}{\rightleftarrows}} \text{CP} \xRightarrow[\text{as}]{\text{Replicated}}$ Buy floating & to finance it borrow fixed

• <u>Binomial valuat^n of Opt^n</u>

S_0, C_0 →

$S_1^+ = S_0 u$
$C_1^+ = \max(0, S_1^+ - X)$

$S_1^- = S_0 d$
$C_1^- = \max(0, S_1^- - X)$

To get expected value of call / put at t=1 calc

<u>Risk-neutral probab</u> $(\pi) = \dfrac{1 + r_f - d}{u - d}$

then calc. $[\pi \cdot C_1^+ + (1-\pi) \cdot C_1^-]$

then. val. @ t=0 $= \dfrac{\downarrow}{1 + r_f}$

• Volatility of underlying : $\underline{S_1^+ - S_1^-}$

• In put-call-fwd parity, if put w/ fwd <u>expires out of money</u>,
<u>payoffs</u> → mkt val. of underlying asset
<u>in-the money</u> → FV of bond

for call → reverse

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$\%\Delta$ full bond price = –annual modified duration(ΔYTM) + $\frac{1}{2}$ annual convexity$(\Delta \text{YTM})^2$

duration gap = Macaulay duration – investment horizon

return impact ≈ –duration × Δspread + $\frac{1}{2}$convexity × $(\Delta\text{spread})^2$

risky asset + derivative = risk-free asset

risky asset – risk-free asset = – derivative position

derivative position – risk-free asset = – risky asset

no-arbitrage forward price: $F_0(T) = S_0 (1 + Rf)^T$

payoff to long forward at expiration = $S_T - F_0(T)$

value of forward at time t: $V_t(T) = S_t + PV_t(\text{cost}) - PV_t(\text{benefit}) - \frac{F_0(T)}{(1 + Rf)^{T-t}}$

Least price ready to be paid for Call opt^n $= C_0 \geq Max\left(0, S_0 - \frac{X}{(1+r)^T}\right)$

intrinsic value of a call = Max[0, S – X]

intrinsic value of a put = Max[0, X – S]

Least price ready to be paid for Put opt^n $= P_0 \geq Max\left(0, \frac{X}{(1+r)^T} - S_0\right)$

option value = intrinsic value + time value

put-call parity: $c + X / (1 + Rf)^T = S + p$

Fiduciary Call = Protective Put

Call + PV(ZCB) = Stk price + Put

Call + PV$\binom{\text{ZCB}}{\text{Riskfree}}$ = PV$\binom{\text{Bond}}{\text{Fwd}}$ + Put

put-call-forward parity: $F_0(T) / (1 + Rf)^T + p_0 = c_0 + X / (1 + Rf)^T$

- Price of underlying (S_0) $= \frac{E(S_T)}{(1+r+\lambda)^T} + \gamma - \theta$ ← PV of costs of holding assets

PV of benefit

risk premium

- Cost of carry $= \theta - \gamma$

- Forward Price = Spot price$(1+r)^t$
- Value @ initiat^n = 0
- Value @ end = Spot price$_T$ – Fwd price
- Value during life of contract = Spot price$_T$ – $\frac{\text{Fwd price}}{(1+r)^t}$
- Value during life of contract w/ cost & benefits = Spot price$_T$ – $\frac{\text{Fwd price}}{(1+r)^t}$ – $(\gamma - \theta)(1+r)^t$
- Fwd price w/ cost & benefits = (Spot price + $\theta - \gamma$) $(1+r_f)^T$

- Asset – Forward = Risk free → Asset = Risk free + Fwd price

Asset + Put = Riskfree + Fwd + put

$\boxed{\text{Call + Bond = PV(Fwd) + put}}$

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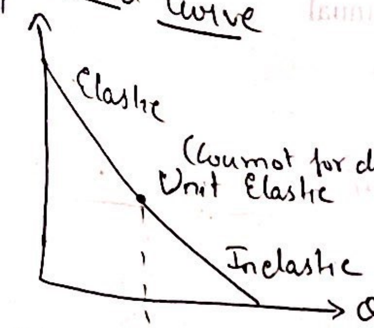
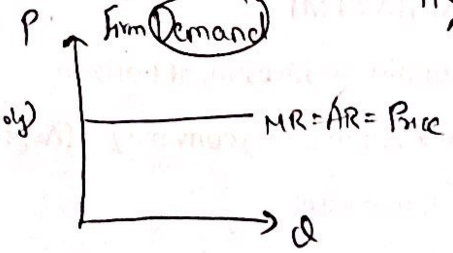
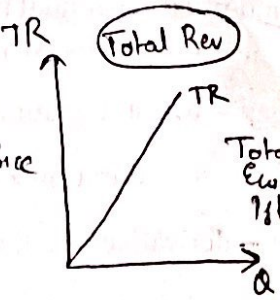
onomic Curves

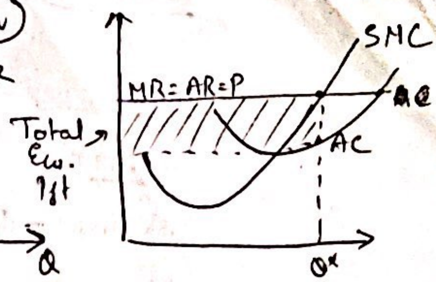
· Demand Curve



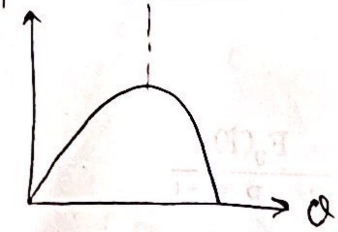
· Perfect Competitn



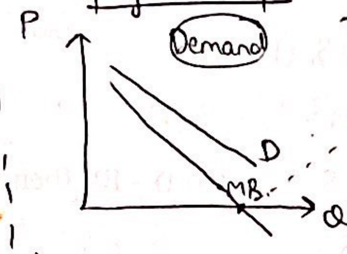


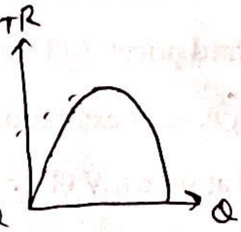


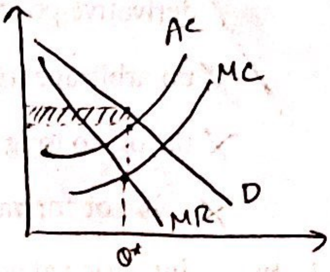
Total Expenditure

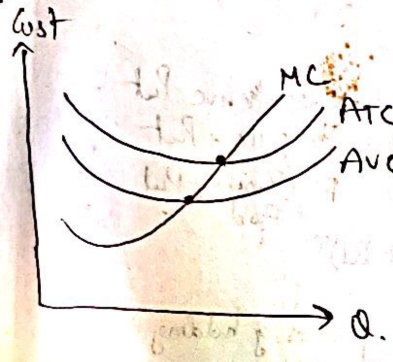


· Imperfect competitn

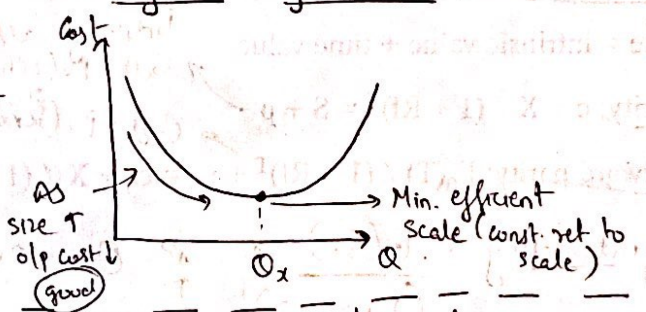






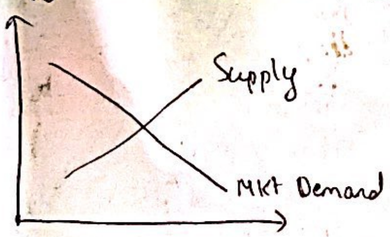


· Long-run avg. cost curve



· Perfect Compet^n

Eco pft = 0 when MR = MC = ATC aka long run ep.



Supply curve related to MC as long as MC ≥ ATC

Monopolistic

P↑ & Q↓ than competitive

Supply fn not defined

Eco pft not poss.

Monopoly

Optimal price when MR = MC & $\frac{\Delta pft}{\Delta Q} = 0$

:MC to avoid comp take adv of consumer surplus

· Oligopoly

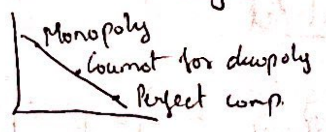
MKt demand is based on:

↳ Pricing interdependence (Kinked DC)

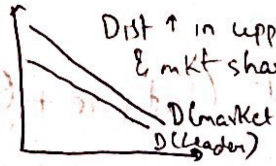
Will follow price ↓ but will not follow price ↑

↳ Cournot assumpt^n

Each firm determines pft-max qty assuming other firms o/p will not change



↳ Dist ↑ in upper part cus as P ↓, small firms exit & mkt share of leader ↑

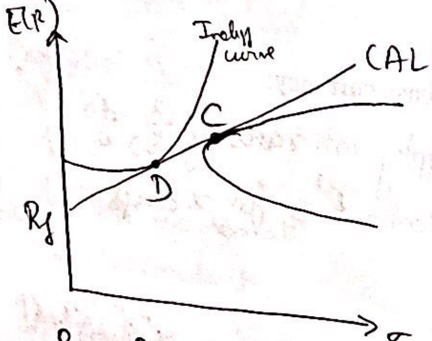


↳ No optimal single price

↳ Eco profit possible

Portfolio Mngmt

- Diversificatⁿ Ratio = $\frac{\text{Risk of equally wt. portfolio of n securities}}{\text{Risk of single security selected @ random}}$
- (1+Return after tax) = (1+ Real Return)(1+ inflatⁿ rate).
- Covariance = $\frac{\Sigma (x_i - \bar{x})(y_i - \bar{y})}{n-1}$
- Utility of investor = $E(r) - \frac{1}{2} A \sigma^2$



C → Best combo of risky assets (Optimal Risky port.)

D → Best combo of risky + risk free (Optimal port.)

CAL → Inv. think there are multiple eff. portfolio

CML → Inv think there is only 1 risky eff. portfolio viz. mkt portfolio

- $\beta = \beta_a w_a + \beta_b w_b$
- Total variance = Syst. var. + Non-Syst. var
  ($\beta_i^2 \sigma_m^2$) (σ_e^2)
- Only β/Syst. Risk is priced & earns a return.

CML	SML	Sec. Characteristic line (SCL)
Slope = Sharpe	Repr. of CAPM	Plots $R_i - R_f$ vs $R_m - R_f$
Applies to eff. port	Slope = Risk premium	
Uses total risk	App. to any security	
	Uses syst. risk	

Nom. ret = Real ret × ~~Risk free~~ Inflatⁿ

Real ret = Risk pre × Risk free

- Sharpe Ratio = $\frac{R_p - R_f}{\sigma_p}$
- M2 = $\frac{(R_p - R_f)}{\sigma_p} \cdot \sigma_m - (R_m - R_f)$

→ Total risk.

→ =0 Mngr doesnt add val
>1 good

- Treynor = $\frac{R_p - R_f}{\beta_p}$
- Jensen's alpha = $R_p - [R_f + \beta(R_m - R_f)]$

→ Syst Risk

→ Best one

FRA

* Income Statements

Revenue Recognitⁿ Models

Long term contracts
- rev can be estimated → % Completⁿ Method
- rev cannot be est → Completed Contract Method (US GAAP) → Rev, Exp & Pft recog @ last
  - Rev = Cost, Profit recog @ last (IFRS)

Installment Sales
- reasonably sure of pmt → PV (instl. pmt) @ time of sale
- Uncertainty → Instal. method OR Cost recovery method
  - Instal. method: Pft each yr = Cash pmt × $\frac{SP-CP}{SP}$
  - Cost recovery method: Start recog. Pft once cash pmt exceeds CP.

Expense Recognitⁿ Models

Inventory
- FIFO (US, IFRS)
- LIFO (US)
- Wt-avg. (US, IFRS)

Depreciation
- SL depr
- Acc depr

Amortizatⁿ

Bad debt & warranty exp. recog

Non-recurring items
- Discont. ops (Shown separately as net of tax after net inc from cont. ops)
- Unusual / Infreq. (Included in current ops)
- Extraordinary (which are both unusual & infreq, not included in current ops).

* Balance Sheet

Current Assets

- Cash & Cash Eq. (Amortized or Fair Val)
- MKT. Securities
- Accts receivables (Net realizable acc)
- Inventories (If LIFO → Lower of hist cost or mkt val
  If not → Lower of hist cost or net realiz. cost)

MKT. Securities
- Held till maturity (Amort val)
- Held for trading } Fair val.
- Avail. for sale } Fair val.

	Bal.	Inc	OCI
H-to-mat	①	②	
H-to-trade	①	②③	
Avail for Sale	①	②	③

① Purchased @
② Int, divid, realized gain
③ Unrealized

Non current Assets

- PP&E
  - Cost Model: Amortized re hist − acc depr (IFRS & GAAP)
  - Revaluatⁿ: Fair value − depr. (IFRS)
- Invst. property
  - Cost Model (IFRS)
  - Revaluatⁿ Model (IFRS)
- Intangible (Research → Expense
  Development → Capitalize)
- Goodwill (Purchase − Fair val of A&L of acq.)

IFRS

- Impairment loss = Carrying val − Recoverable amt

Recoverable amt = max (net realizable val., PV(CF from asset))

USGAAP

Recoverability test: Impaired iff carrying val > Asset's future undisc CF

Impairment loss = Diff. btn fair val. & carrying amt.

Loss for bonds redeemed b4 maturity
= Redemptn price − BV of bond liab @ reacq. date