Finance

A discipline concerned with determining value and making decisions based on that value assessment. The finance function allocates resources, including the acquiring, investing, and managing of resources.

Direct agency costs:
- Expenditures that benefit management: car, accoms, big office, high pay
- Monitoring costs: auditors, audit committee, corporate governance

Indirect agency costs:
- Lost opportunities which would increase firm value in the long run, if accepted.

Finance markets- act as intermediaries between savers and borrowers
1. **Primary mkt** - newly-issued securities are traded (IPO, priv. offerings)
2. **Secondary mkt**- Where existing securities are traded (SGX/NYSE)
3. **Dealer mkts** – transactns bet. buyers and sellers occur through dealers (OTC)
4. **Auction mkts** - highest bid price is matched w lowest ask price (SGX/NYSE)
5. **Money markets** – where short term securities (< 1 year) are traded.
6. **Capital markets** – equity and long-term debt (>1 year)

Financial Statement Analysis

Book value = original cost – accum. Depreciation
Mkt value = current trading value in mkt
MV of shareholder's equity = **mkt cap** = share price * num of outstanding shares
Enterprise value: value the underlying business assets excluding the value of non-operating assets = MV of equity + debt – excess cash
Stocks: shares outstanding + treasury shares
Sources of cash: Fall in assets (other than cash) and increase in liabilities
Net Operating working capital: Working capital that stem from operating policies (**A/R, Inventory, A/P, etc.**), and removed from financing decisions
- **Current liabilities that are interest bearing** are considered financing decisions (notes payable, short-term loans)
- **Non-interest-bearing liability** such as acc. payable are considered under **OWC**

Operating cash flow (OCF): EBIT*(1- tax_rate) + Depreciation
Net Capital Spending (NCS): end. net fixed assets – beg. net fixed assets + dep.
Interest tax shield = tax deductible on interest exp. = Tax rate * Interest expense
Cash flow from Assets (CFFA, aka FCF) = OCF – NCS - ΔNOWC
Cash flow to creditors = interest paid + change in borrowing
Cash flow to stockholders = dividends paid + new net equity raised
CFFA + Interest Tax shield = Cash Flow to creditors + Cash Flow to stockholders

1. **Liquidity Ratios**
- **Current Ratio** = CA/CL **Quick Ratio** = (CA – Inventory)/CL
- **Cash Ratio** = Cash/CL **NWC to Total Assets** = (CA – CL) / TA
- **Interval measure** = CA/Avg daily operating cost

2. **Long-term solvency ratios**
- **Total Debt Ratio** = TL/TA **Debt Equity ratio** = TL / TE
- **Equity multiplier(EM) = Leverage** = TA/TE = 1 + DE ratio
- **Long term debt (LTD) ratio** = LTD/ (LTD + TE)
- **Times interest earned ratio** = EBIT/Interest
- **Cash Coverage ratio** = (EBIT + depr)/interest

3. **Market value ratios**
- **P/E ratio** = Price per share / Earnings per share
- **M/B ratio** = mkt price per share/ BV per share

4. **Asset management ratios/Activity ratios**
- **Inventory turnover** = COGS/Inventory
- **Day's sales in inventory** = 365/Inventory
- **Receivable's turnover** = Credit Sales/Receivables
- **Day's sales outstanding** = 365/ receivable's turnover
- **FA turnover** = Sales/Net fixed assets **TA turnover** (TATO) = Sales/Total assets

5. **Profitability ratios**
- **Profit Margin (PM)** = Net income/ Sales
- **Basic earning power (BEP)** = EBIT/Total assets
  - BEP removes the effects of taxes and financial leverage, useful for comparison
- **Return on Assets (ROA)** = Net income/Total assets
- **Return on Equity (ROE)** = Net income/Total common equity = PM X TATO X EM = profitability * efficiency * leverage

Time value of money

Interest rate is sometimes referred to as:
- **discount rate/cost of capital/required return/market cap rate**

Simple interest FV = PV + PMT
Compound interest $FV = PV(\mathbf{1}+\boldsymbol{i})^{\boldsymbol{n}}$, where *i* = period rate, *n* = num of periods, **Future value interest factor (FVIF)** = $(1+i)^n$
PV = FV * $\frac{\mathbf{1}}{(\mathbf{1}+\boldsymbol{i})^{\boldsymbol{n}}}$ (bolded is the PVIF)

EXCEL:	**FV(period_rate, num_periods, pmt_amt, [pv], [type])** **PV(period_rate, num_periods, pmt_amt, [fv], [type])** - **type: 0 - end of period (default) , 1 – beginning of period**

$\boldsymbol{PV_{Annuity}} = \boldsymbol{PMT} * \frac{1}{i} * \left(\mathbf{1} - \frac{1}{(1+i)^n}\right)$	$\boldsymbol{FV_{Annuity}} = PMT * \frac{1}{i} * [(1+i)^n - 1]$
$\boldsymbol{PV_{Annuity\ Due}} = PV_{Annuity}$ * (1 + i)	$\boldsymbol{FV_{Annuity\ Due}} = FV_{Annuity}$ * (1 + i)
$\boldsymbol{PV_{growing\ annuity}} = C_1 * \left[\frac{1-\left(\frac{1+g}{1+i}\right)^n}{i-g}\right]$	$\boldsymbol{FV_{growing\ annuity}} = C_1 * \left[\frac{(1+i)^n-(1+g)^n}{i-g}\right]$
$\boldsymbol{PV_{perpetuity}} = \frac{PMT_1}{i}$	$\boldsymbol{PV_{growing\ perpetuity}} = \frac{C_1}{i-g}$

Annual percentage rate (APR): Period rate * Number of periods per year
- Also known as **nominal annual rate**, **quoted rated**, **stated rate**

Effective annual rate (EAR): actual rate after taking into consideration **any compounding that might occur within the year**

$\boldsymbol{EAR} = \left(1 + \frac{APR}{m}\right)^m - 1$ → m = compounding freq. per year, $\frac{APR}{m}$ = period rate

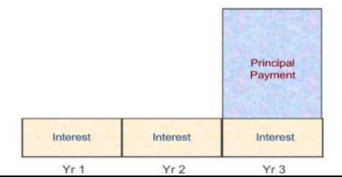
Converting APR to EAR w calculator:	ICONV function → Fill up **NOM, EFF, C/Y** accordingly and press <CPT> - C/Y stands for compounding per year
With EXCEL	- EFFECT(nominal_rate, num_compounding_per_year) - NOMINAL(effective_rate, num_compounded_per_year)

Types of loans

1. **Pure discount loans**
- Entire principal and interest are paid at maturity. Loan is issued at discount, meaning that we already pay for the interest on the principal when we receive the loan.

2. **Interest only loans**

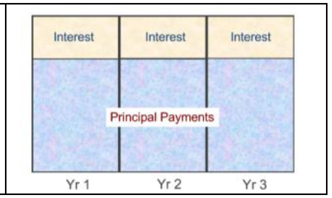
We pay interest on the principal every period.



3. **Flat Loans**

Total simple interest is calculated for the overall loan period, then divided equally over all payments.

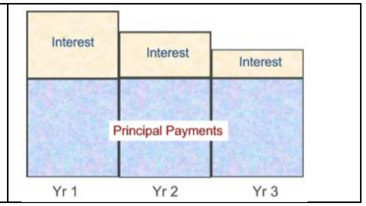
Can be considered as an annuity



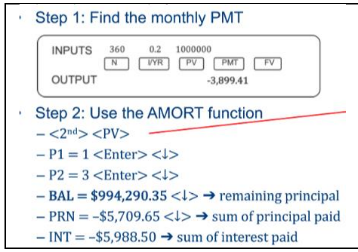
4. **Amortized loans with fixed principal paid down**

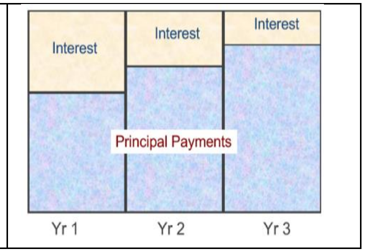
Each payment covers the period's interest expense plus a **fixed principal portion**.

Amortization in this case is the payment made on the principal



5. **Amortized loans with fixed instalment payments**
- Each **equal** payment covers both the period's interest expense and reduces principal





Risk and Return

Dollar terms = Amt received – Amt invested
Percentage terms = $\frac{amount\ received - amount\ invested}{amount\ invested}$
Total dollar return = Dividend income + Capital gain/loss
Dividend yield = $\frac{Dividend\ received}{initial\ share\ price}$ **Capital Gain yield** = $\frac{Capital\ gain}{initial\ share\ price}$
Total % return = $\frac{Dividend + Capital\ Gains}{Initial\ Share\ Price}$ = Dividend yield + Capital gain yield
- **Capital gain yield** and **total percentage return** can be positive, negative or zero.
- Only **dividend yield** cannot be negative.

$\mathbf{1} + \boldsymbol{real\ return} = \frac{1 + nominal\ rate}{1 + inflation\ rate}$ **real return** ≈ nominal return-expected inflation

Expected return: $\hat{\boldsymbol{r}} = \sum_{s=1}^{n} P_s r_s$,where:
P_s = probability of event s, r_s = return of event s

Calculating Average return with **historical returns instead** of probabilistic data
- **Geometric avg return** $\bar{r} = [(1+r_1)(1+r_2)(1+r_3)\ldots(1+r_n)]^{\frac{1}{n}} - 1$
- **Holding period return** $\bar{r} = (1+r_1)(1+r_2)(1+r_3)\ldots(1+r_n) - 1$
- **Arithmetic avg return** $\bar{r} = \frac{r_1+r_2+\cdots+r_n}{n}$ Note: $AM \geq GM$

Risk is the total uncertainty associated with future possible outcomes
Standard deviation when **all future possible returns** and probabilities are known:

all future possible returns and probabilities are known	$\sigma = \sqrt{\sum_{s=1}^{n} P_s (r_s - \hat{r})^2}$
with **historical data** (Note: $\bar{r}$ in formula is arithmetic mean)	$s = \sqrt{\frac{\sum_{i=1}^{n}(r_i - \bar{r})^2}{n-1}}$

Stand-alone risk: is the risk an investor would face if they held only this one asset
Coefficient of Variation (CV) is a measure of relative variability.
$CV = \frac{standard\ deviation}{expected\ rate\ of\ return} = \frac{\sigma}{\hat{r}}$
Covariance = $\sigma_{XY} = \rho_{XY}\sigma_X\sigma_Y = \sum_{s=1}^{n} p_s \times (r_{X,s} - \hat{r}_X) \times (r_{Y,s} - \hat{r}_Y)$

The volatility of a portfolio is the total risk of the portfolio, as measured by the portfolio standard deviation

- $\sigma_{portfolio} = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho_{12}\sigma_1\sigma_2}$

We **enjoy diversification benefits** as long as we combine assets that **are less than perfectly positively correlated**.

Remember **Bessel's correction** for **historical data:** divide by n-1 instead of n

Total risk = systematic + unsystematic = mkt risk + diversifiable risk

- **Total risk** measured using standard deviation

Systematic = **market risk** = non-diversifiable risk (measured using beta)

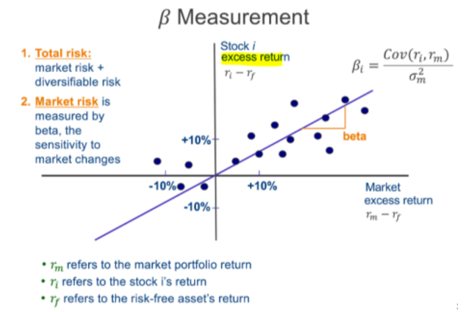
Unsystematic = firm-specific risk = diversifiable

The **total risk** measure of a well-diversified portfolio is essentially equivalent to **systematic risk**.

```
0.5%|2.0% |13.5%|34% || 34%|13.5%|2.0% |0.5%
<--3σ----2σ----1σ----0----1σ----2σ----3σ-->
```

Market risk

$\beta = \frac{Cov(r_i, r_m)}{\sigma_m^2} = \frac{\rho_{i,m}\sigma_i}{\sigma_m} \rightarrow$ slope of the regression line



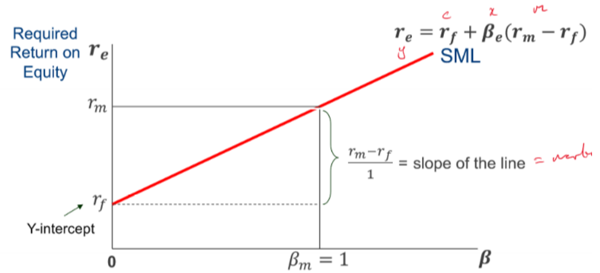
Capital asset pricing model (CAPM) – Defines the relationship between **required return** (r_e) and **market risk** (β_e) :

$$r_e - r_f = \beta_e(r_m - r_f)$$

Security market line (SML)

Slope of line = $r_m - r_f$ = market risk premium

r_f = risk free rate → gives indication of pure time value of money



Portfolio Beta: weighted sum of individual betas: $\beta_p = \sum_{i=1}^{m} w_i\beta_i$

Beta = 1 → asset has same sys. risk as overall market

Beta < 1 → asset has < sys. risk than overall market

Beta > 1 → asset has > sys. risk than overall market

- For a fairly priced asset, the expected return is on the SML
- For an underpriced asset, the expected return is above the SML
- For an overpriced asset, the expected return is below the SML

Impact of risk aversion change - Slope steepens as risk premium (r_m-r_f) increases
Impact of inflation change - Slope remains the same, but SML translate upwards

Markowitz Portfolio Theory

- Efficient portfolio – portfolio that provides greatest exp return/ lowest risk for a given level of SD (risk).
- Efficient Frontier – Line connecting all efficient portfolios
- For same return, risk is max; For same risk, return is max Mkt portfolio – portfolio at tangent line of risk-free asset
- Mkt portfolio – portfolio at tangent line of risk-free asset
- **CML** shows all possible combinations of **risk-free asset** and **mkt portfolio**
- Calculating portfolio rate of return $r_p = r_f + \frac{r_m - r_f}{\sigma_m}\sigma_p$

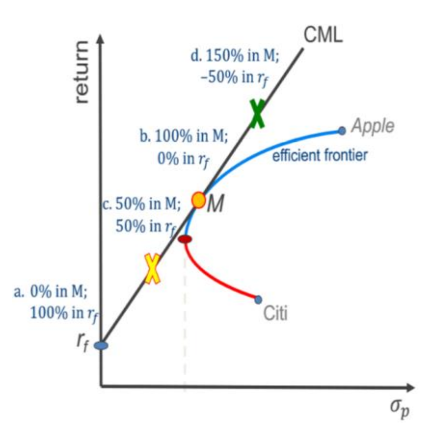
Assuming $25000 capital % 40/60 market portfolio between stock X/Y

a. **$25000 in r_f, 0 in market**

b. **$25000 in market, 0 in r_f**
- 25000 * 0.40 in stock X
- 25000 * 0.60 in stock Y

c. **$12500 in r_f, $12500 in market**
- 12500*0.4 in stock X
- 12500*0.6 in stock Y

d. $37500 in market, **borrow** 12500 against r_f



Bond Valuation

Coupon payment = $\frac{annual\ coupon\ rate \times par\ value}{no.of\ coupoin\ payments\ per\ year}$

Par value = Face value (or principal amount) (usually $1000 if not specified)

Sell at Par → present sell price = face value of bond → coupon rate = req. return

Callability → Issuer can redeem bond for its face value before maturity

Putability → Buyer can redeem bond's face value before maturity

Seniority → Determines which bond is paid out first

Debenture → Bond is backed by the issuer's general credit and ability to repay, and not by an asset or collateral (basically purely trust basis) (unsecured bonds)

Indenture → Bond contract stipulating the basic terms of the bonds – principal, coupon rate, maturity date, collateral (if any), other features of the issue and rights and duties of the buyer

Convertibility → The option to exchange a bond for a specified amount of stock in the same issuing company

Protective covenants →Some conditions the limit the actions of the issuer during the term of the loan (usually to protect the bondholder/creditor)

Basis points: Unit of measure, 1 bp = 0.01% = 0.00001

Sinking fund → A pool of money set aside by an issuer to help repay a bond issue. Reduces risk of being short on cash at time of bond maturity.

Bond Value = PV of coupons + PV of par = PV annuity + PV lump sum

Current Yield: $\frac{total\ annual\ coupon\ received}{current\ market\ price}$ **Note that zero-coupon bonds have no current yield**

Yield-to-Maturity (YTM): market rate for holding the bond; rate that discounts future cash flows to current value; the required return for investing in such bond

Bond Pricing Theorem: Bonds of similar risk will be price to yield about the same return (YTM), regardless of its coupon rate.

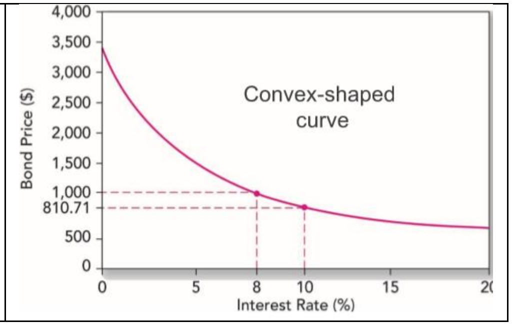
1-yr holding period return (HPR) = $\frac{annual\ coupon + (sale\ price - purchase\ price)}{purchase\ price}$

Coupon rate < Current Yield < YTM → **Discount** bond (since it needs to be sold at discount to make up for the poor coupon rate)

Coupon rate > Current Yield > YTM → **Premium** bond

Coupon rate = Current Yield = YTM → **Par value** bond

↑ Interest rates → ↓ Bond's PV; ↑ YTM → ↓ Bond prices

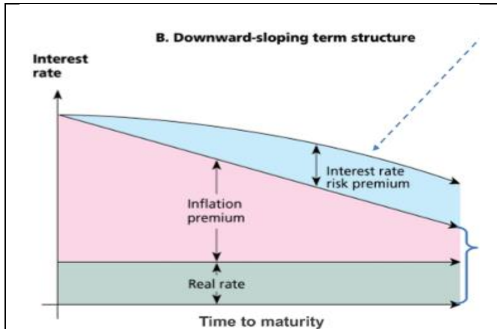


- **Bond prices** are pulled to par as it approaches maturity.

Yield Curve

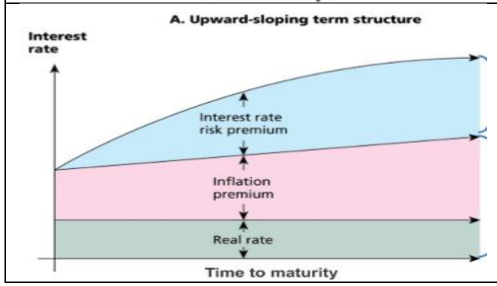
Also known as **Term structure of interest rates**. The relations between yield and time to maturity, for bonds of the same risk and holding all else equal.

- To consider bonds of the same issuer risk over time, we focus on gov. issued bills, notes, bonds of all different maturities.



Inverted yield curve is caused by decreasing inflation premium. Investors expect inflation to fall in the long-term, which is the result of negative economic sentiment.

Short-term yields > long term yields



Long-term yields > short-term yields

Factors that affect Corporate Bond Yields:

1. **Real Rate of Interest** – decided by the fed
2. **Inflation Premium** – inflation risk
3. **Interest rate risk prem.** – risk borne from longer holding period

From the Govt. Yield Curve

4. **Default risk premium** – compensation for risk of firm going bankrupt
5. **Liquidity risk premium** – risk of bond being hard to sell in secondary mkts
6. **Tax premium** – compensation for taxes – firms need to ensure investors are better off after paying taxes as compared to tax-free alternatives

Stock valuation

Book Value – Price paid to acquire asset, less accumulated depreciation
Mkt Value – price determined in competitive market
Intrinsic Value - PV of expected future cash flows (determined by size & timing of CF and discounted by required rate of return)
Stocks have 2 types of return → capital gain & dividend pay-out
Required return = dividend yield + capital gain yield

Estimating Intrinsic Value of Firm

For firms that pay dividends, we can calculate the PV of a firm by treating the firm as a series of cashflows.

1. **Constant Dividend Firm**
   - Treat firm as if it is a perpetuity → PV = PMT/i or $P_0 = D_1/r_e$
2. **Constant Dividend Growth Firm (Gordon Growth Model)**
   - Treat firm as growing perpetuity → $P_0 = \frac{D_0(1+g)}{r_E - g} = \frac{D_1}{r_E - g}$ | $r_E = \frac{D_1}{P_0} + g$
   - r_E can be calculated using CAPM
   - **Prerequisites**: $r_E > g$; g expected to be constant forever
   - Suitable for stable firms with constant growth, or with dividend pay-out policy.
3. **Non-constant growth**
   - Compute PV of each cashflow arising from dividends until growth is constant.

$r_f \approx r^* +$ inflation premium for expected inflation – r* is the real risk-free rate

Corporate Valuation Model (CVM) (Free Cash Flow Method)
Sometimes firms do not pay dividends, so we must evaluate them using the CVM. Since a firm's FCFs from operations is the cash that a company has left over to pay back to providers of capital, it can be used to value corporations. **CVM** suggests that the **current** value of the entire firm equals the **PV** of the firm's **FCF**.

Applying CVM:

1. Find **MV of firm** by finding **PV of the firm's projected CFFAs**
   a. $MV_{firm} = \frac{CFFA_1}{1+wacc} + \frac{CFFA_2}{(1+wacc)^2} + \cdots + \frac{CFFA_\infty}{(1+wacc)^\infty}$
2. **MV of common stock = MV of firm – MV of debt**
3. **Intrinsic Stock Price** = $\frac{MV\ of\ common\ stock}{No.\ of\ outstanding\ shares}$

Capital Budgeting

Net Present Value (NPV) = **intrinsic** value of project – present value cost

- If PV(Cash inflows) > PV(Cash outflows), taking on the project will ↑ the value of the firm (**Accept the project if NPV > 0**)
- $NPV = \left[\sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}\right] - CF_0$, where *r* = required return (use CAPM)

Payback Period → No. of yrs. to recover initial costs/break-even on nominal basis

1. Estimate the expected future cash flows
2. Add future cash flows (w/o discounting) to the initial cost until initial investment has been recovered.

Accept the project if the number of years to break even is less than pre-set limit

Discounted Payback Period → Same as Payback period, except we consider time value of money and discount back future cash flows.

Average Accounting Return → $\frac{Average\ Net\ Income}{Average\ Book\ Value}$ (Accept if AAR > pre-set rate)

- Average book value depends on the depreciation schedule of the asset
- We use straight-line depreciation for this module

Internal Rate of Return (IRR) → The discount rate that makes **NPV = 0**

- Accept if IRR > required return
- $NPV = C_0 + \frac{C_1}{(1+IRR)} + \frac{C_2}{(1+IRR)^2} + \cdots + \frac{C_n}{(1+IRR)^n}$ (Direction of each C_i applies)
- Calculator: Enter cashflows into **CF** worksheet, then press <IRR> button

NPV vs IRR - Gives the same decision generally, except in the following cases:

1. **Mutually exclusive** projects, where initial investments and timing of cash flows are different.
2. **Non-conventional cash flows** – cash flow direction changes more than once → **May result in more than one IRR, or none at all**
3. NPV assumes CFs are reinvested at the company's WACC, but IRR assumes cash flows are reinvested at the IRR itself. The former is more realistic → **Choose NPV method for mutually exclusive projects**

Independent vs Mutually Exclusive projects

- Independent – CFs unaffected by accepting other
  - Choose project with higher IRR/NPV
- Mutually exclusive – CFs adversely impacted by accepting other

NPV profiles cross due to size and timing difference

- At low discount rates, bigger projects usually have higher NPV
- If rates are high, projects with predominantly large initial CFs will have higher NPV and IRR since large CFs are received earlier → subjected to less discounting.

Modified Internal Rate of Return (MIRR) Accept if MIRR > WACC

- Correctly assumes reinvestment of cashflows at company's cost of capital instead of at IRR.
- Avoids the problem of non-conventional cashflows
- Combination approach to calculating MIRR: $PV_{outflows} = \frac{TV_{inflows}}{(1+MIRR)^t}$

Profitability Index (PI) Accept if PI > 1; or if Proj A > Proj B → Accept A

- Also known as benefit-cost ratio
- $PI = \frac{PV_{all\ future\ cashflows}}{Initial\ Cost}$ (note: numerator is the **intrinsic** value)

Cashflows in a typical project

Start-up Costs	On-going costs	Shut-Down costs
- Equipment purchase - Initial R&D costs - Increase in NOWC (increase in inventories, raw materials, etc)	- Incremental revenues - Incremental costs - Taxes - Changes in NOWC	- Sale of equipment (net of any taxes) - Shut down costs - Decrease in NOWC

Identifying Relevant Cashflows

- **Sunk costs** – costs incurred regardless of present decisions, **not relevant**
- **Opportunity costs** – cost of next best alternative by taking the project
- **Side-effects** – Benefits/costs to other projects (e.g. erosion/cannibalization)
- Changes in NOWC, Taxes
- **Financing Costs** – Interest expense, tax on interest expense, dividends paid, principal repaid are **not relevant** – these are CFs from financing activities.

Weighted Average Cost of Capital (WACC)

- Accounts for firm's after-tax equity and debt financing costs
- $\boldsymbol{WACC = \frac{E}{V} r_e + \frac{D}{V} r_d (1 - t_c)}$
- $\boldsymbol{r_e}$: required rate of return on equity (calculated using CAPM)
- $\boldsymbol{r_d}$: required rate of return on debt (found using YTM of firm's long-term debt)
- $\boldsymbol{t_c}$: marginal corporate tax rate
- $\boldsymbol{E, D, V}$ are the market values of the firm's equity, debt and total value.
- Payments to equity holders are not tax-deductible, and remain at r_e after tax
- Payments to debtholders are tax-deductible, and so becomes $r_d(1 - t_c)$. Tax deductibility of interest expenses lowers the net cost of debt to firm

Overall Incremental Project Cashflows

1. Net investment outlay (affects NOWC)
2. Future operation cashflows (on after-tax basis)
3. Cash outflows required to support initial investment outlay (affects NOWC)
4. Terminal year CF (**net salvage value, NOWC)**

Depreciation Tax Shield: $Depr\ Exp * Tax\ rate$
Computing Depreciation: (assume straight line depreciation to **zero**)

- Annual Depreciation expense = $\frac{Initial\ Cost - Residual\ Value(0\ for\ this\ course)}{No.of\ Useful\ Years}$
- Accumulated depreciation = $Depr\ Exp \times Number\ of\ years\ in\ use$
- Book value = $Initial\ cost - Accum.depreciation$

Net Salvage Value *Let S = salvage value, B = book value at time of sale*

- $NSV = S - (\boldsymbol{S - B}) * \boldsymbol{T}$ (bolded term is the tax paid on capital gain/loss)

Methods to compute OCF

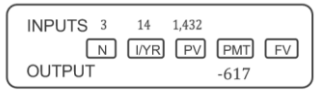
1. **Bottom-up approach** (**assuming no interest expense**)
   - $OCF = NI + Depr$
   - $NI = Sales - Cost - Depr - Taxes$
   - $Taxes = t_c \times (Sales - Costs - Depreciation)$
2. **Top-Down Approach** (**assuming no interest expense**)
   - $OCF = Sales - Costs - Taxes$
3. **Tax-Shield Approach**
   - $OCF = (Sales - Cost)(1 - t_c) + Depr \times t_c$

Unequal Life Projects: 2 methods

1. Compare using NPV (assuming we do not renew the project at end of life)
2. Compute Equivalent Annual Annuities (EAA) (assuming we renew at EoL)

- Convert NPV into an annuity
- NPV = $1432,
- project lifespan = 3 years
- Assuming r_e of 14%,
- This tells us that receiving $617 every period is equivalent to receiving $1432 every 3 periods

Machine 1:



Long-Term Capital Budgeting and Forecasting

Elements of financial planning

- Investment in new assets – Determined by **capital budgeting decisions**
- Degree of financial leverage – Determined by **capital structure policy**
- Cash paid to shareholders – Determined by **dividend policy**
- Liquidity and working capital requirements – Determined by firm's **net working capital** decisions

Dimensions of Financial Planning

- **Planning Horizon**: The period on which financial planning process focuses on
- **Level of aggregation**: The degree to which smaller investment proposals of each firm's operation units are added up and treated as a big project
- **Alternative sets of assumptions about key variables and scenarios**: Simulate plans by making assumptions – Modelling plans and making assumptions that range from pessimistic to optimistic scenarios (what-if analysis)

Ingredients of Financial Planning

1. **Sales Forecast** 2. **Pro-Forma Statements**
3. **Asset Requirements** - how much **additional** fixed assets will be required to meet sales projections/forecast
   - Assuming we are at full capacity, Δ Assets = Assets × growth rate
   - Alternatively, we might use a **capacity intensity ratio** = $\frac{Assets}{Sales}$ to find the assets necessary to support $1 of sales. This can be different for different asset types.
4. **Financial Requirements** – how much and what type of financing to pay for the required assets
5. **The plug variable** – to make balance sheet balance
6. **Economic Assumptions** – explicit assumptions about coming economic environment, e.g., interest rates, tax rates, etc.

Percentage of Sales approach - For any business, some items on the balance sheet and income statement will vary directly with sales, while other do not:

Income Statement	Balance Sheet
✔ **Costs** will generally vary sales.	✔ **Current Assets** generally vary directly with sales.
✘ **Depreciation Expense** does not vary, unless by assumption to simplify	✘ **Net Fixed Assets** do not vary, unless by assumption to simplify
✘ **Interest Expense** does not vary - depends on management decisions about **capital structure**	✘ **Accounts Payable** will generally vary directly with sales
✘ **Dividends** do not vary directly with sales unless management decides to make it so.	✘ **Notes payable, Long-Term Debt and Equity** do not vary - depend on management decisions about capital structure
	✘ **Retained Earnings** portion of Equity will change **based on Dividend** decision

External Funds Needed (also known as Additional Funds Needed)

- Choose a plug variable:
  1. Borrow short-term debt (↑ Notes Payable) 2. Borrow LT debt (↑ LT debt)
  3. Sell Common Stock (↑ Shares outstanding)
  4. Reduce Dividends (↑ **Addition** to Retained Earnings)
- $EFN = \overbrace{\left(\frac{\Delta S}{S_0}\right)\mathbf{A}^*}^{\text{Assets Needed}} - \overbrace{\left(\frac{\Delta S}{S_0}\right)\mathbf{L}^*}^{\text{Gain in Liability}} - \overbrace{\boldsymbol{M(S_1)(RR)}}^{\text{Addition to Retained Earnings. = Increase in owner's equity.}}$
- A^*: Qty of assets that vary with sales $\boldsymbol{L}^*$: Qty of liabilities that vary with sales
- S_0: Current Level of Sales, S_1: Projected Level of Sales for the coming year
- ΔS: $S_1 - S_0$, $\frac{\Delta S}{S_0}$ =Percentage change in Sales, M: Profit Margin = $\frac{Net\ Income_0}{S_0}$
- RR: Retention Ratio = 1 – Dividend Pay-out Ratio

Important Assumptions for EFN Equation:

- Firm is operating at full capacity → Total assets vary with sales
- Constant Profit Margin **(not possible if there is interest expense)**
- Constant Dividend Pay-out/Retention Ratio

Internal Growth Rate (IGR) – The maximum growth rate achievable with no external financing (i.e. no financing from liabilities)

- $IGR = \frac{ROA \times RR}{1-(ROA \times RR)}$ ROA =Return on Assets= $\frac{NI}{Total\ Assets}$, RR =Retention Ratio

Sustainable Growth Rate (SGR) – Maximum growth rate achievable with no external equity while maintaining a constant debt-equity ratio

- Debt-equity ratio increases if the company grows at a faster pace than SGR → Increasingly unsustainable as company becomes overly leveraged without corresponding increase in external equity
- $SGR = \frac{ROE \times RR}{1-(ROE \times RR)}$

Determinants of growth : ROE & RR

- ↑ RR → more internal funds → ↑ SGR
- Anything that increases ROE:
  - ↑ Profitability → ↑ Profit Margin → ↑ more internal funds → ↑ SGR
  - ↑ Asset-use efficiency → ↑ sales generated for every dollar in assets → ↓ firm's need for new assets as sales grow → ↑ SGR
  - ↑ Leverage → ↑ in debt financing available → ↑ SGR

Capacity Sales: Max qty. of sales that can be supported by current level of assets

- $Capacity\ Sales = \frac{Current\ Sales}{Current\ Fixed\ Asset\ Utilization}$

Target Ratio - the amount of fixed assets needed for every dollar of capacity sales:

- $Target\ Ratio = \frac{Fixed\ Assets}{Capcity\ Sales}$ or $\frac{Fixed\ Assets \times Fixed\ Asset\ Utilization}{Current\ Sales}$

<u>Short-Term Financial Planning</u>

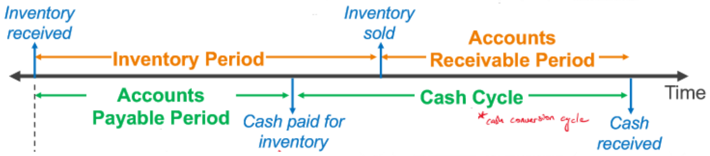
Gross Working Capital = Current assets

Net Working Capital (NWC) = Current assets – Current Liabilities

Net Operating Working Capital (NOWC) = Operating Current Assets – Non-interest-bearing Current Liabilities = (Cash + A/R + Inventories) – (A/P & Accruals)

Δ Cash = Δ Retained Earnings – Δ Current Assets other than cash – Δ Net Fixed Assets + Δ Current Liabilities + Δ Long term Debt + Δ Common Stock

<u>Cash Cycle</u>



X Period = 365/**X** Turnover (general formula)

Inventory Turnover = COGS/Avg Inventory

Receivables Turnover = Credit Sales/Avg Receivables

Payables Turnover = (COGS + End Inv. – Beg. Inv.)/Avg Payables

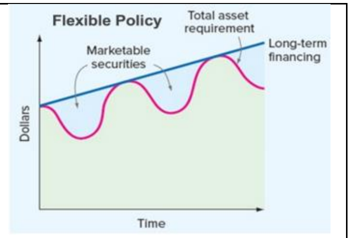
Operating Cycle = Inventory Period + A/R Period = A/P Period + Cash Cycle

<u>Working Capital Policy</u> is reflected in 2 ways:

(a) Amount of current assets relative to sales; (b) How current assets are financed

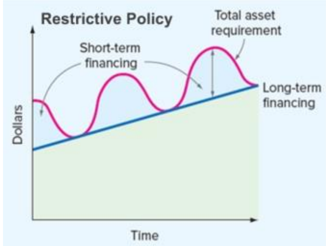
Flexible policy characterised by:

- (a) High ratio of current assets to sales
- (b) Low proportion of short-term debt relative to long-term debt
- Holds marketable securities as buffer against changing short-term asset needs
- Never does any short-term borrowing



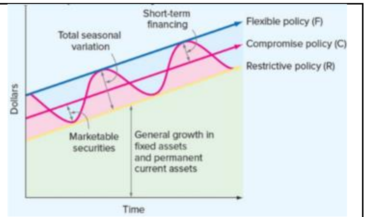
Restrictive policy characterised by:

- (a) Low ratio of current assets to sales
- (b) High proportion of short-term debt relative to long-term debt
- Holds relatively little in marketable securities
- Borrows short-term to finance any short-term asset needs, then pays down when need for assets back down



Compromise policy:

- Firm has middle level of long-term financing and holds some marketable securities.
- Sells these securities when short-term asset needs rise, before it makes short-term borrowing
- Maintains marketable securities during times of low short-term asset needs



<u>How much short-term assets is ideal?</u>

Carrying Costs – costs that rise with increased level of current assets

- Costs to store and finance the current assets
- Opportunity costs associated with current assets, i.e. rate of return of cash or marketable securities vs rate of return of long-term investments

Shortage Costs – costs that fall with increased levels of current assets

- Costs to replenish current assets, e.g. order costs for inventory
- Costs related to lack of safety reserves, i.e., lost sales, customer goodwill and production stoppages

<u>Reasons For Holding Cash</u>

Speculation - Cash ready to take advantage of additional investment opportunities, such as bargain purchases

Pre-caution – Cash acts as safety margin/ financial reserve

Transaction motive – need to hold cash to satisfy normal disbursement and collection activities associated with the firm's ongoing operations

Compensating balance – Cash balances kept in banks to compensate for banking services that the firm receives

<u>Credit Policy</u>

$$Accounts\ Receivable\ =\ Credit\ sales\ per\ day\ \times\ Day's\ Sales\ outstanding$$

Why grant credit?

- A way to stimulate sales since customers can delay payment (↑ price,↑ sales)
- **<u>However</u>**, there is a chance that customer will not pay and
- cost of carrying the receivable → Need to finance your operations while awaiting payment

Terms of a Sale → *2/10 net 30* means customer will receive **2%** discount off net price if payment made within **10** days, else they have to pay within **30** days at net

Credit Analysis

- Process of whether to extend credit to a particular customer. Involves:
  1. Gathering relevant information 2. Determining creditworthiness
- Information sources to assess creditworthiness includes:
  1. Financial statements
  2. Credit reports about customer's payment history with other firms
  3. Banks 4. Customer's payment history with the firm

Credit Scoring & Factors

- **Character** – Customer's willingness to meet credit obligations
- **Capacity** – C's ability to meet credit obligations out of operating cash flows
- **Capital** – Customer's financial reserves
- **Collateral** – An asset pledged in the case of default
- **Conditions** – General economic conditions in the customer's line of business

Collection Policy

- **Aging Schedule** – compilation of accounts receivable by age of each account

Collection Effort

1. Delinquency letter 2.Telephone call 3.Employ collection agency 4.Legal action

- Firm may refuse to grant additional credit until arrearages are cleared up

Breakeven quantity for credit policy

- **NPV of switch** = Cost of Switching + PV of incremental cashflows

$$\Delta Q = \frac{\Delta P \times Q - PQr}{(vr - P' + v)}$$

$$\Delta P = \frac{\Delta Q(vr - P + v) + PQr}{Q'}$$

Q = Current Qty, P = Current Price, Variable Cost = v, New Qty = Q', New Price = P'