Investment Management & Corporate Finance

March 2024

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Day 2

Topic 10: Equity Financing

Introduction
Types of Equity Securities

Common Shares

- Investors in common shares have an ownership interest in the company (voting rights). They have a residual claim on the company's net assets in case of liquidation.

- Common shares may also be callable or putable.
  - **Callable** common shares.
    - Advantages:
      - Buy shares at a lower price and resell them at the higher market price.
      - Save on dividend payments and preserve its capital.
  - **Putable** common shares.
    - Advantages:
      - Putable common shares limit investor losses. Makes it easier to raise capital, as the put feature makes the shares more appealing to investors.

Preference Shares

- **Cumulative:** Unpaid dividends accrue over time
- **Noncumulative:** Unpaid dividends are forfeited permanently and do not accrue over time.
- **Participating:** Preferred dividends + additional dividends if the company's profits exceed a pre-specified level.
  - Might get additional distribution of assets upon liquidation above the par value of the preference shares.
- **Nonparticipating:** Only entitled to a fixed preferred dividend and the par value of shares if liquidated.
- **Convertible:** These are convertible into a specified number of common shares based on a conversion ratio.
  - Advantages:
    - Higher dividend than common shares.
    - Opportunity to share the profits of the company.
    - Can benefit from price appreciation if converted.
    - Price less volatile

Types of Equity Securities
Other types

- **Golden Shares**
  - Gives shareholder veto power over changes to the company's charter.
  - It holds special voting rights, giving its holder the ability to block another shareholder from taking more than a ratio of ordinary shares.

- **ICULS (Irredeemable Convertible Unsecured Loan Stock)**
  - A hybrid security that has some qualities of a **debt instrument** and some characteristics of an **equity warrant**.
  - Like a bond, an ICULS pays a **fixed interest coupon** to the holder semi-annually or annually at a predetermined rate.
  - Like a warrant or a convertible bond, an ICULS can be **converted into common shares** of stock, which can appreciate in value for the investor.

- **Warrants**
  - Instruments that give the holder **the right to buy a particular stock at a predetermined price within a stipulated time frame**.
  - However, to gain this right, the buyer of such warrants usually needs to make an upfront payment to the warrants issuer. On exercise of such warrants, fresh shares are issued by the issuer company.

Public Issue of Shares
The IPO market

Reasons for going public

1. Companies can raise additional capital by selling shares to the public. The proceeds may be used to expand the business, fund research and development or pay off debt.
2. Young companies with little or no track record can gain access via ACE market
3. Other avenues for raising capital, via venture capitalists, private investors or bank loans, may be too expensive.
4. Going public in an IPO can provide companies with a huge amount of publicity.
5. Companies may want the standing and gravitas that often come with being a public company, which may also help them secure better terms from lenders.
6. Signify good corporate governance and best industry practices

Other methods of offering

1. **Offer for sale**
   - Definition: Offer to public by existing shareholders of existing shares
   - Proceeds will go to vendors/offerors of securities
   - In contrast, in an IPO, proceeds of the issue will flow to company
2. **Placement** – Sale of securities to persons selected by issuer
3. **Tender** – Offer of portion of securities by way of tender subject to minimum price being subscribed

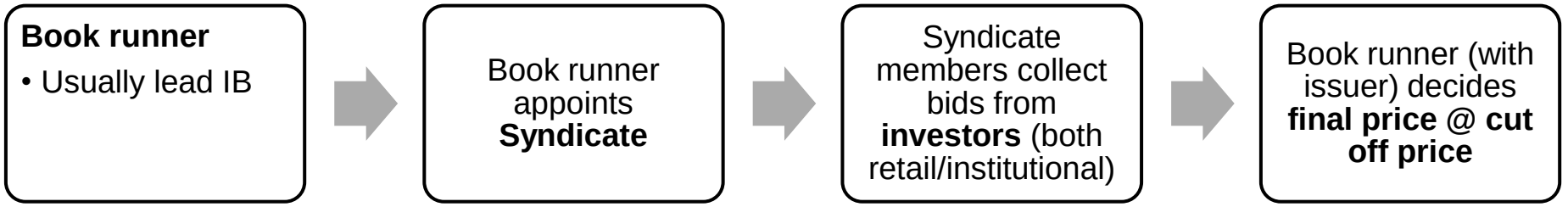
Public Issue of Shares

The IPO market

Methods of IPO Issue Price determination

1. **Fixed Price method**
   - Company determines IPO price after taking into consideration the reasonable value of company based on certain quantitative and qualitative factors

2. **Book building method** – company indicates either floor price or price band within which the investors can place their bids.



3. **Auction method** – Auction is an exchange process in which good or services are sell by the seller to the buyer with the highest bid.
   - Lowest bid will be taken as the price and any oversubscription is taken care of by pro-rata allotment of shares

Rights issues

Overview

- **Definition:** A rights issue is the issue of new shares to existing shareholders of the company for cash to raise additional capital for investment, paying debts, diversification, acquisitions or working capital.

- **Mechanism:** New rights shares are offered in proportion to the shares already owned by current shareholders.
  - Eg, in a 1-for-2 rights issue, existing shareholders are eligible to subscribe for 1 share in the company for every 2 shares held.

- Current shareholders would have a pre-emptive right to the shares, meaning that they will be offered the rights issue shares first.
  - **Renounceable rights issues:** shareholders can renounce their subscription rights to others.
  - **Non-renounceable rights issues:** the rights shares can only be renounced in favour of existing shareholders.

- **Provisional Allotment Letter (PAL)** - A document given to current shareholders in a rights issue, which offers them the **right to subscribe for the allocated shares**.
  - Can renounce their rights and sell their entitlement to others selling the PAL during the cum-rights trading period.
  - PAL will also contain a provision that would allow shareholders to subscribe for more shares.
  - If shareholders decide not to do anything, the rights expire and become worthless.

Example

Rights issue and Theoretical Ex-Rights Price

Company XYZ offers a rights issue of RM0.50 on basis of 1 rights share for every 2 shares held. The last transacted price of Company XYZ shares on 14th February 2021 was RM 0.79. The weighted average market price of Company XYZ for the last 5 days was RM0.78. Calculate the Theoretical Ex-Rights Price (TERP).

Effects of Corporate Exercises

1. Bonus Issues

- Issues of new “free” shares to current shareholders
- Does not change total market capitalization of the company but **decreases value per share proportionately.**
- Usually meant to increase liquidity of company shares.

- **Example:**

Company ABC has an authorized share capital of RM30,000 with a par value of RM1 per share. The issued and paid up share capital is RM10,000. Assume that company ABC currently has RM50,000 in retained earnings. The share price is currently trading at RM40 per share. Management declares a 1:1 bonus issue. Calculate the **theoretical ex-bonus price of the share**

Effects of Corporate Exercises

2. Injection of quality assets

- Achieved through an acquisition exercise
- Purchase can be done via shares or cash or combination of both
- The change in share price after acquisition depends on expectations of the investors

3. Share/Capital reduction - Can be achieved in 2 ways:

i. Capital Reduction

- Cancel an amount of issued and paid up share capital (thereby reducing the paid up value of the shares)

ii. Share repurchase (followed by cancellation)

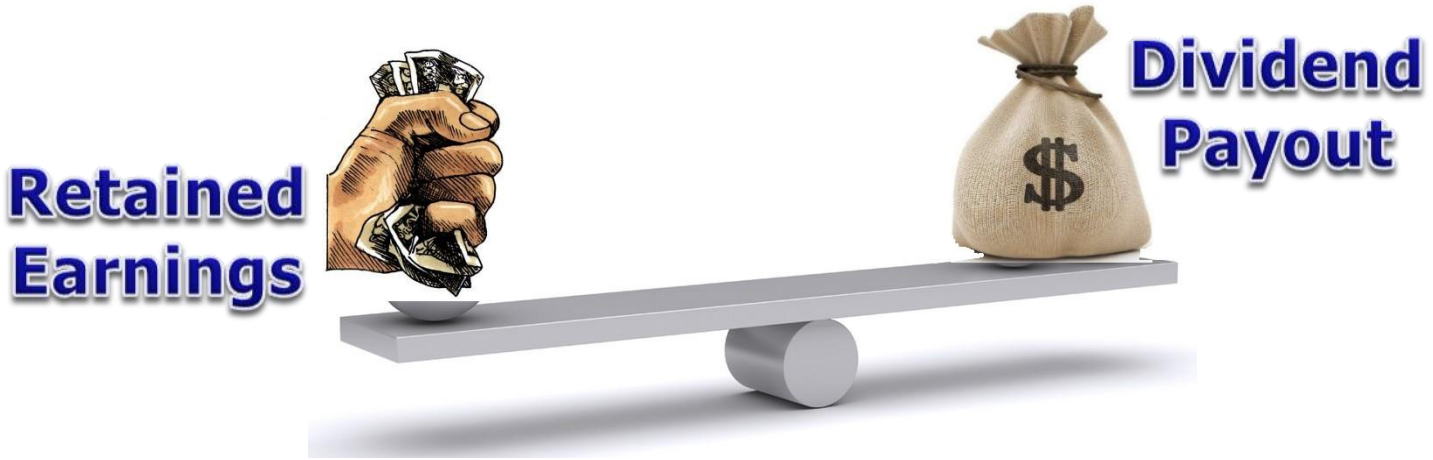
- **Advantages:**
  - Shares repurchased are kept as **treasury shares** which can be resold/redistributed as share dividends
  - **Stabilise** share price (+ve signal to investors)
  - To adjust **capital structure**
- **Disadvantages:**
  - **Reduces financial resources of company** which means less investment opps in future
  - **Lower cash reserves** which can be used for cash dividends
  - Signals **no more** profitable investment opportunities.

Topic 11: Dividend Policy

Definitions of dividend

- That part of profits of a company which is distributed among its shareholders – a reward of the shareholders for investing in the company.

- Has to balance between the growth of the company and the distribution to the shareholders - a critical influence on the value of the firm



Forms of Dividends

Cash Distributions

- Regular Cash Dividend
- Extra Dividend
- Liquidating Dividend

Noncash Distributions

- Stock Dividend
- Stock Split
- Reverse Stock Split

Cash dividends vs Stock Dividends

- A **regular cash dividend** is a cash dividend paid at regular intervals of time
  - Tendency of companies is to **maintain or increase** dividends
  - Often viewed as signals of management's assessment of the company's future (that is, whether the company can maintain the dividend in the future).
  - Companies prefer not to cut or reduce the dividend.

- A **stock dividend** is the distribution of additional shares of stock to shareholders on a pro rata basis.
  - Also known as a **bonus issue of shares**.
- A stock dividend does not change a shareholder's proportionate ownership, the shareholder does not receive cash, and there are no tax consequences.
- **Advantages for the issuer:**
  1. More shares outstanding and, therefore, potential for more shareholders.
  2. Lowers the stock's price, which may make it more attractive as an investment.
  3. No economic effect.
  4. Does not affect financial ratios.
- No effect on company's capital structure (mix of source financing) because it leaves the MV of equity and debt unchanged. This is the difference between cash and stock dividends.

Stock splits vs Reverse Stock splits

A **stock split** is a proportionate increase in the number of shares outstanding.

- Stock splits are similar to stock dividends, in that each shareholder ends up with more shares but no change in his percent ownership of the company.
- Usually viewed as a positive sign for future stock gains by some investors.
- However, announced stock splits more often merely recognize that the stock has risen enough to justify a stock split, and return the stock price to the “optimal” range.

A **reverse stock split** is the proportionate reduction in the number of shares.

- Increases share price and reduces the number of shares outstanding – again, with no change to the underlying fundamentals.
- Just as a rising stock price might indicate an upcoming stock split, so, too, a dramatically falling stock price might indicate an upcoming reverse stock split.
- Reverse stock splits are perhaps most common for companies coming out of bankruptcy or when the share price declines to a low value.

Dividend Theories

Dividend Preference Theory

- Suggests that investors prefer the certainty of a cash dividend over the uncertainty of a stock price increase (Bird-in-hand argument)
- Result: Higher dividends lead to higher stock prices (lower cost of equity)

Dividend Irrelevance Theory

- Modigliani-Miller (MM): Dividend policy is irrelevant
- Assumes perfect markets: No corporate taxes, bankruptcy costs, transactions cost
- **Homemade dividends**
  - Investors wanting more dividends can sell shares (or fractions of shares)

Tax Preference Theory

- Investors prefer small dividend payments to large payments because:
  - Capital gains are:
    1. Sometimes taxed at a lower rate
    2. Not taxed until realized
- Result: Smaller dividends result in higher stock price and lower cost of equity

Other Dividend Theories

Clientele Effect due to:

- Tax considerations: In the presence of differential taxes on dividends/capital gains, investors would prefer one over the other.
- For a given amount of dividend (D), investor would be indifferent if the price of the stock would drop by ΔP when it goes ex-dividend

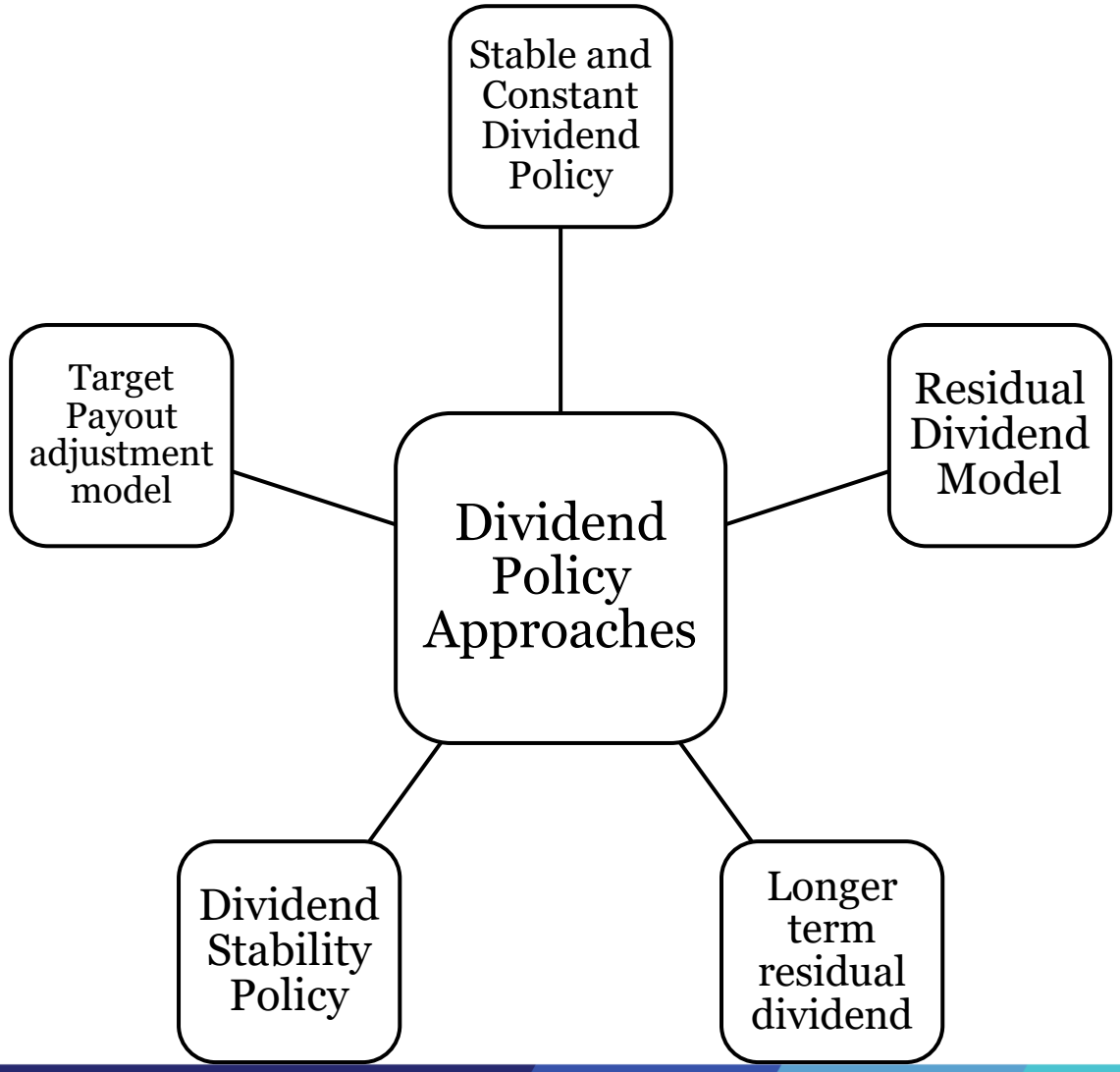
$$\Delta P = \frac{D(1-TD)}{(1-TCG)}$$

- Requirements of institutional investors
- Individual investor preferences

Agency Issues

- Between shareholders and managers
  - Dividends reduce FCF for managers to invest in empire building
- Between Shareholders and Bondholders
  - Dividends transfer wealth from bondholders to shareholders

Dividend Policy Approaches



Dividend Policy Approaches

Stable and Constant Dividend Policy

- **Stable dividend policy**
  - Dividends are based on long-term earnings forecast. Dividends are smoothed so as to not fluctuate with earnings

- **Constant dividend payout policy**
  - Dividend payout is constant and hence dividends fluctuate directly with earnings; seldom used

Dividend Policy Approaches
Residual Dividend Model

- Dividends = Earnings minus funds retained to finance equity portion of capital budget
- Model based on:
  - Investment opportunity schedule
  - Target Capital schedule
  - Access to and cost of external capital

- **Steps to determine target payout ratio:**

1. Identify optimal capital budget
2. Determine amount of equity needed given target capital structure
3. Meet equity requirements to extent possible with retained earnings
4. Pay dividends with the residual earnings

- **Advantages**

1. Model simple to use
2. Management can identify investment opportunities without considering dividends

- **Disadvantages**

1. Dividend payments may be unsustainable
2. Uncertainty about future dividends signal higher risks; potentially raises capital costs

Dividend Policy Approaches

Residual Dividend Model

Example

Bradam Berhad has a target debt:equity ratio of 0.50. In 2020, Bradam has total available cash of RM7 million. They plan to spend RM9 million for capital expenditure. If Bradam has a residual dividend policy, what is the dividend amount that they will most likely pay out?

Dividend Policy Approaches

Longer Term Residual Dividend Model & Dividend Stability Policy

Longer Term Residual Dividend Model

- Forecast capital budget out 5 – 10 years
- Allocate left-over earnings as dividends
- Pay out in relatively equal amounts
- Distribute excess with share repurchases

Dividend Stability Policy

- Steady $ dividend payout, regardless of earnings volatility
- Based on forecast of long-run earnings:
- Dividend growth rate = long run earnings growth rate

Dividend Policy Approaches

Target Payout Adjustment model

- Dividends paid out as a % of total earnings
- General Approach:
  - Set target dividend payout based on long-term sustainable earnings
  - Move slowly toward that target
  - Avoid cutting or eliminating dividend except in extreme circumstances

Example:

Last year, Aurora Bhd had earnings of $3.50 per share and paid a dividend of $0.70. In the current year, the company expects to earn $4.50 per share. The company has a 35% payout ratio and plans to bring its dividend up to the target payout ratio over a 5 year period.

$$\text{Expected Dividend} = (\text{Previous Dividend}) + [(\text{Expected increase in EPS}) \times (\text{Target Payout Ratio}) \times (\text{Adjustment factor})]$$

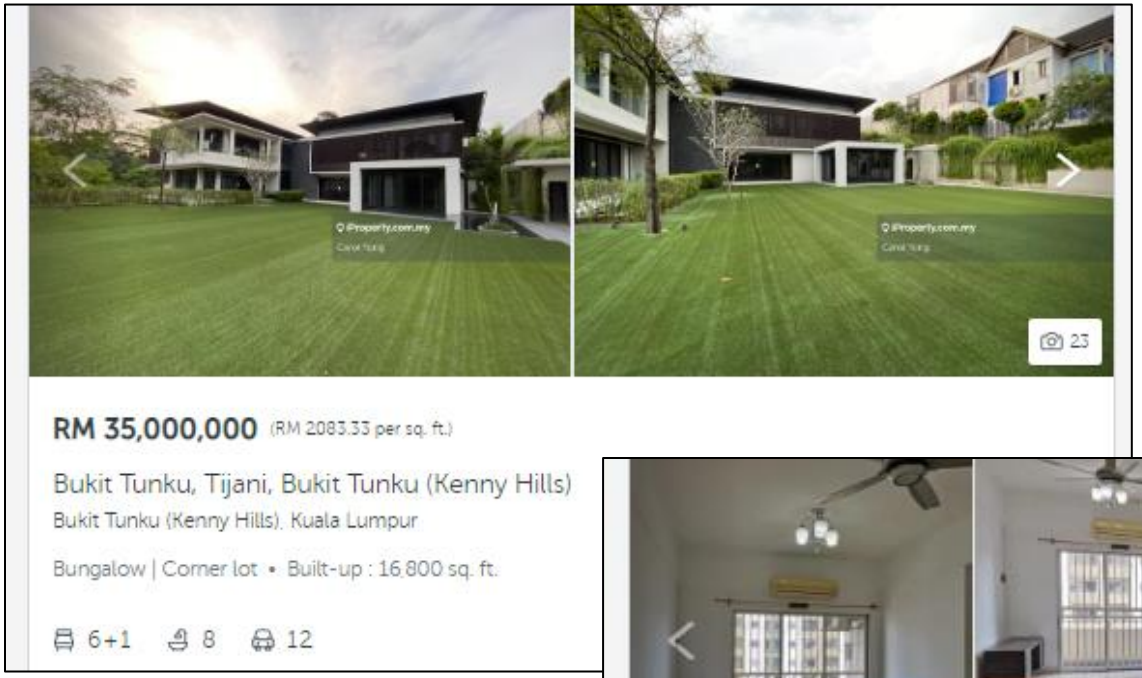
Share Repurchase vs Cash Dividends

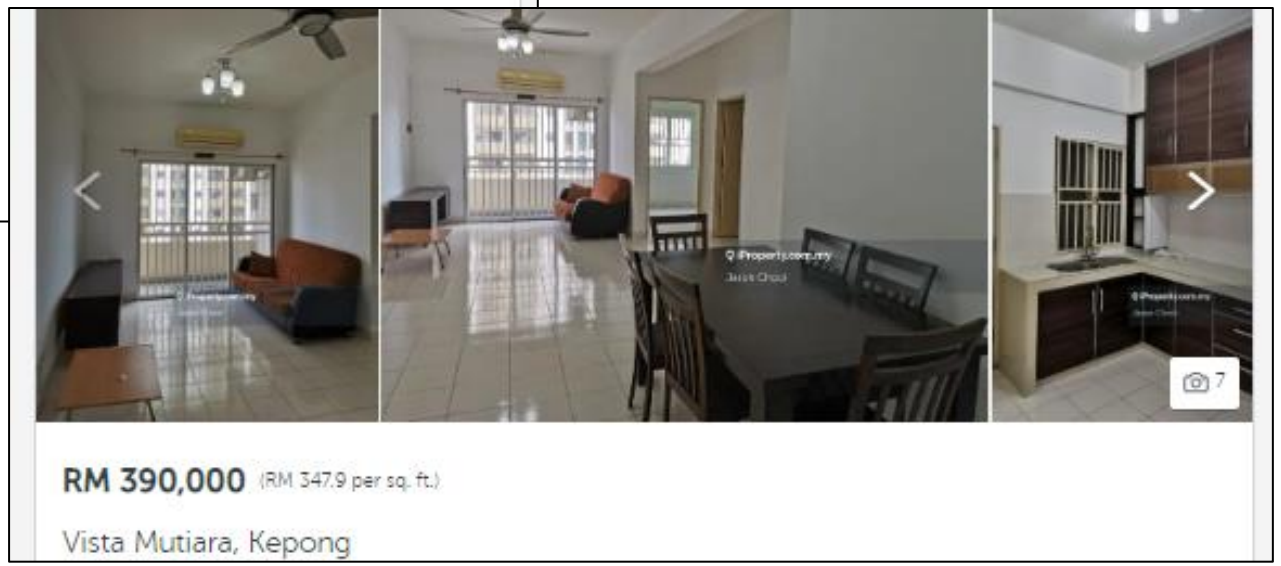
Share repurchase methods

Open market transactions	Fixed price tender offer	Dutch Auction	Repurchase by direct negotiation
• Most flexible approach • Allows company to buy back its shares in the open market at the most favorable terms. • No obligation on the part of the company to complete an announced buyback program. • American companies do not need shareholder approval for open market transactions	• Firm buys a predetermined number of shares at a fixed price • Company forgoes flexibility but allows company to buy back shares rather quickly. • If more than the desired number of shares are tendered in response to the offer, the company will typically buy back a prorated number of shares from each shareholder responding to the offer.	• Tender offer in which the company specifies a range of prices. • Dutch auctions identify the minimum clearing price for the desired number of shares that need to be repurchased. • Dutch auctions also can be accomplished rather quickly, though not as quickly as tender offers.	• Co purchase shares from a major shareholder • Often used in a greenmail scenario to the detriment of the remaining shareholders. • A negotiated purchase can also occur when a company wants to remove a large overhang in the market that is dampening the share price.

Topic 12: Equity Valuation

Pricing or Valuing?





Pricing or Valuing?

5 October 2022
Equity Research
Asia Pacific | Malaysia

[redacted]

MR. D.I.Y. Group

Recessionary fears could bode well

MRDI.KL

Target price (12M, RM) 2.50
Outperform

General Merchandise Stores | Upgrade Rating

- **Recessionary fears could bode well for discount retailers.** As Mr DIY was only listed in 2020, we have limited data on how the homegrown discount retailer has fared during past crises. The closest comparison was in 2015, when Malaysia was grappling with GST and consumer confidence slumped to a record low; during that year, Mr DIY recorded a SSSG of 18.5% thus we believe it is reasonable to expect a similar magnitude of resilience amidst weaker consumption prospects. Drawing examples from global discount retailers, we note that Dollar General's SSSG grew 9.0% in 2008, 9.5% in 2009 and 16.3% in 2020. Meanwhile, Dollar Tree and Family Dollar outperformed the S&P 500 by 58% and 74% respectively, measured from the equity market's peak in 2007 to its trough in 2009.

Previous rating	Neutral
Price (5 Oct 22, RM)	1.99
Upside/downside (%)	25.6
Mkt cap (RM/US$ mn)	18,760 / 4,047
Enterprise value (RM mn)	19,821

Our Blue Sky Scenario (RM) **3.30**

Our blue sky scenario of RM3.30 assumes Mr DIY trades up to Nestle's 46x FY22 PE due to scarcity premium, the chase for growth and potential index inclusion.

Our Grey Sky Scenario (RM) **1.70**

Our grey sky scenario of RM1.70 assumes zero SSSG into the forecasted years (2020-2025) in our DCF model.

Price vs Value: The Set Up

Drivers of intrinsic value
- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price
- Market moods & momentum
- Surface stories about fundamentals

Accounting Estimates

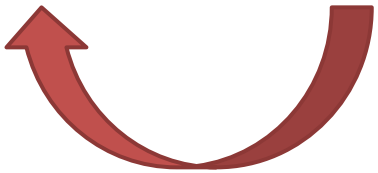
Valuation Estimates

INTRINSIC VALUE

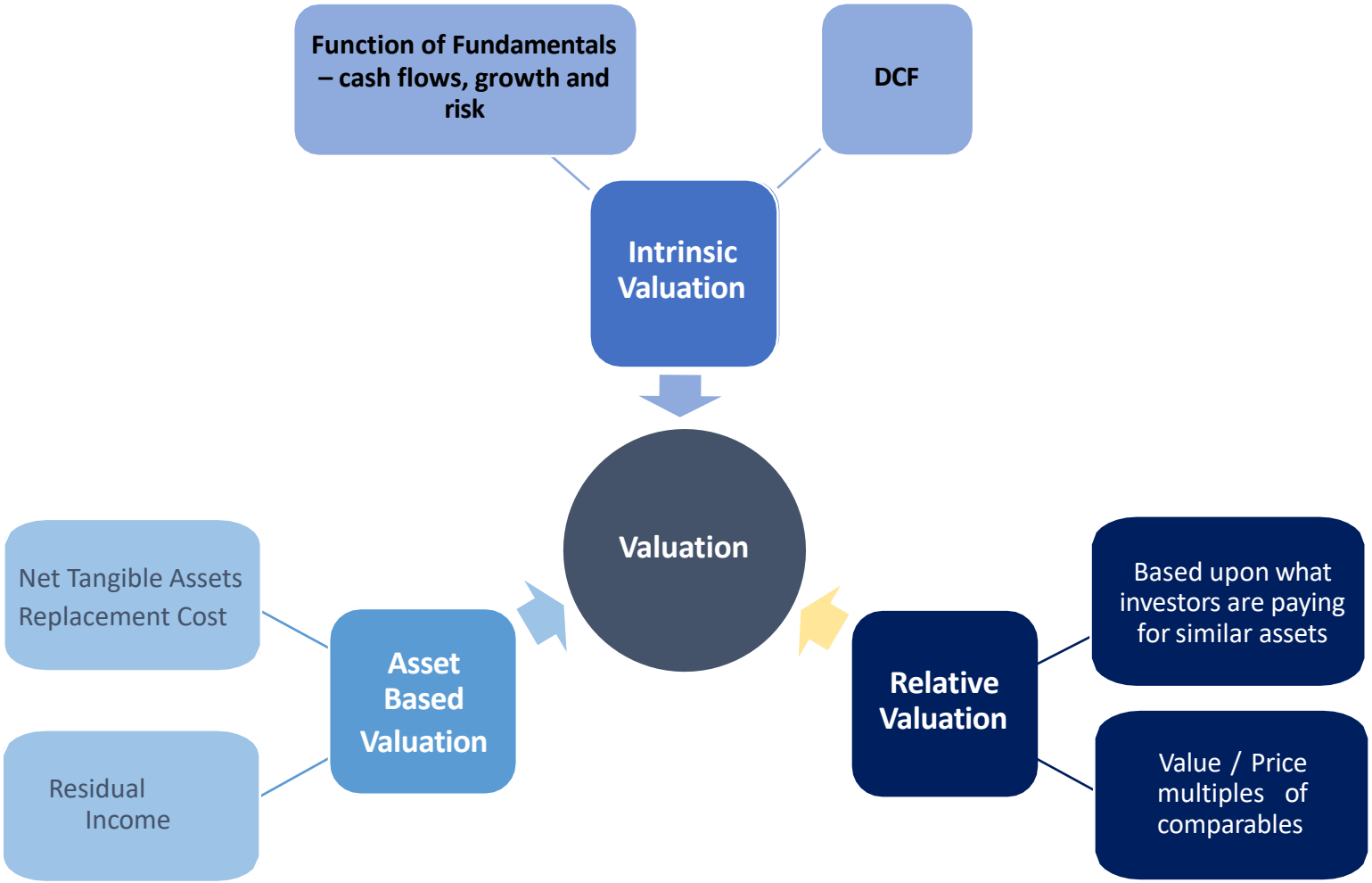
THE GAP

Is there one?
If so, will it close?
If it will close, what will cause it to close?

PRICE



3 approaches to valuation



Intrinsic Valuation: Discounted Cash Flow Valuation (DCF)

Present Value (PV)…again

- **Present value is today's value of tomorrow's cash flow**. A dollar in the present is worth more than a dollar in the future because you can invest a dollar today and earn a positive rate of return. This process is called **compounding**.

- The **reverse** of compounding **is discounting**, which converts a future cash flow into a present value.

- 3 determine the present value of cash flow:

1. **How large is the cash flow?** This is how much you expect to receive in the future. The larger the future cash flow, the larger the present value.

2. **How risky is the cash flow?** Riskiness determines the rate of return that you require from an alternative investment that generates a cash flow with the same level of risk. Certain cash flows have low risk and uncertain cash flows have high risk.

3. **How long do we have to wait for the cash?** The longer you must wait, the less valuable the cash flow because
   - First, you can invest your money in alternative investments that would earn interest during those years.
   - Second, if you are not 100 percent confident that you will get the cash, the more risk you will have to assume as time passes.

Present Value (PV)…again

- **The formula to calculate present value incorporates these three factors:**

$$PV = FV \frac{1}{(1+r)^n}$$

PV = present value

FV = future value

r = rate of return

n = number of periods

Intrinsic Valuation: DCF

Value of growth

The future cash flows will reflect expectations of how quickly earnings will grow in the future (as a positive) and how much the company will have to reinvest to generate that growth (as a negative). The net effect will determine the value of growth.

Expected Cash Flow in year t = E(CF) = Expected Earnings in year t - Reinvestment needed for growth

Cash flows from existing assets

The base earnings will reflect the earnings power of the existing assets of the firm, net of taxes and any reinvestment needed to sustain the base earnings.

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots\ldots + \frac{E(CF_n)}{(1+r)^n}$$

Steady state

The value of growth comes from the capacity to generate excess returns. The length of your growth period comes from the strength & sustainability of your competitive advantages.

Risk in the Cash flows

The risk in the investment is captured in the discount rate as a beta in the cost of equity and the default spread in the cost of debt.

Intrinsic Valuation: DCF

Equity Valuation

- The value of equity is obtained by discounting expected cashflows to equity, i.e. the residual cashflows after meeting all expenses, tax obligations and interest and principal payments, at the cost of equity, i.e. the rate of return required by equity investors in the firm.

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \frac{CF\ to\ Equity}{(1+k_e)^t}$$

where,

- CF to Equity $_t$ = Expected Cashflow to Equity in period t
- k_e = Cost of Equity

- The **Dividend Discount Model (DDM)** is a specialized case of equity valuation, and the value of a stock is the present value of expected future dividends.

Intrinsic Valuation: DCF

Firm Valuation

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

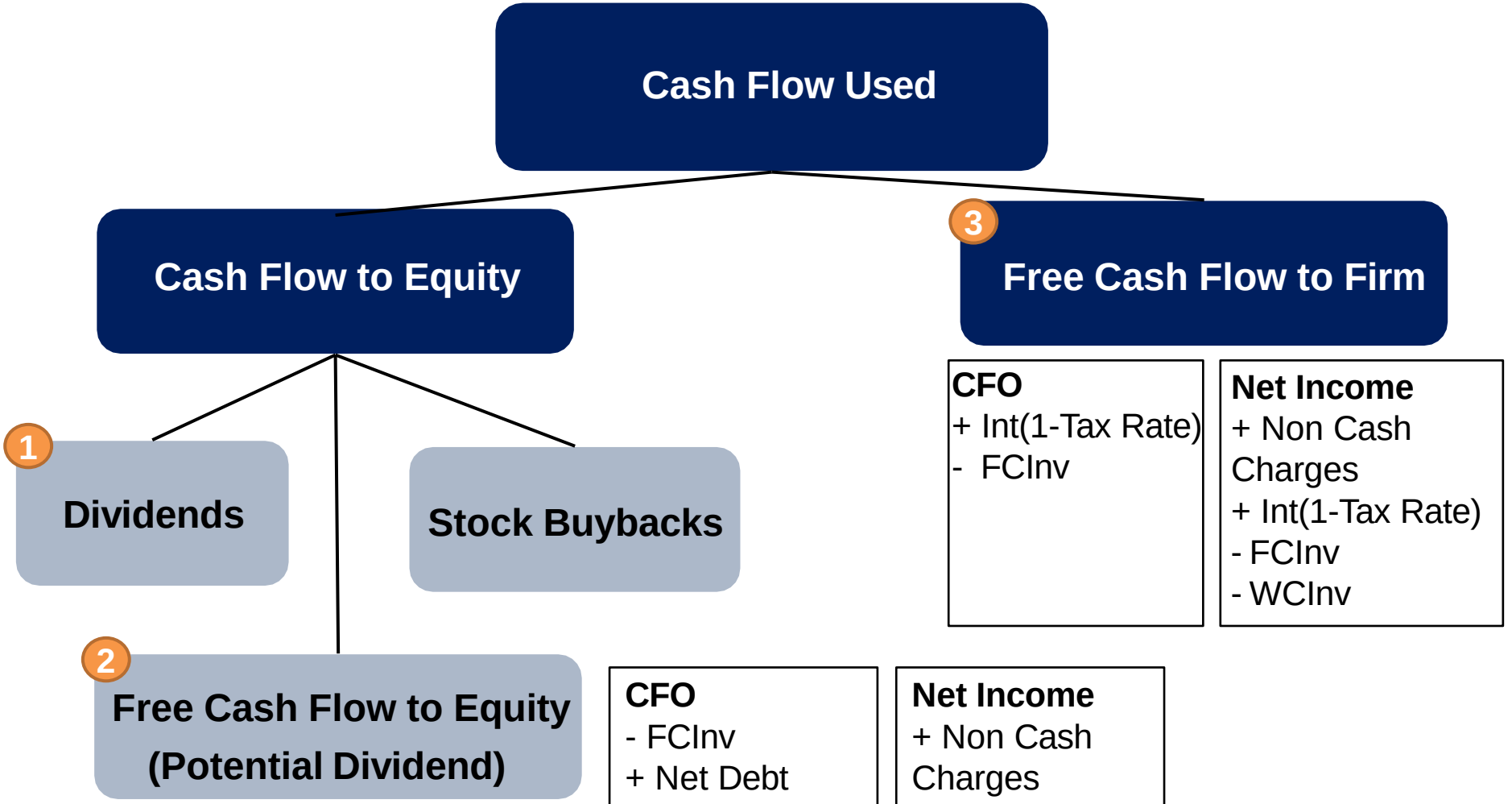
$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{CF\ to\ Firm}{(1+WACC)^t}$$

where,

- CF to Firm $_t$ = Expected Cashflow to Firm in period t
- WACC = Weighted Average Cost of Capital

Intrinsic Valuation: DCF

I. Estimating Cash Flows



Intrinsic Valuation: DCF

Choosing a Cash Flow to Discount

- When you cannot estimate the Free Cash Flows to Equity or the firm, the only cash flow that you can discount is **Dividends**. For financial service firms, it is difficult to estimate free cash flows. Eg AMMB Holdings Berhad

- If a firm's debt ratio is not expected to change over time, the **Free Cash Flows to Equity** can be discounted to yield the value of equity. Eg Nestle Malaysia Berhad

- If a firm's debt ratio might change over time, Free Cash Flows to Equity become cumbersome to estimate. Here, we would discount **Free Cash Flows to the Firm**. Eg Astro Malaysia Holdings Berhad

Intrinsic Valuation: DCF

II. Discount Rates

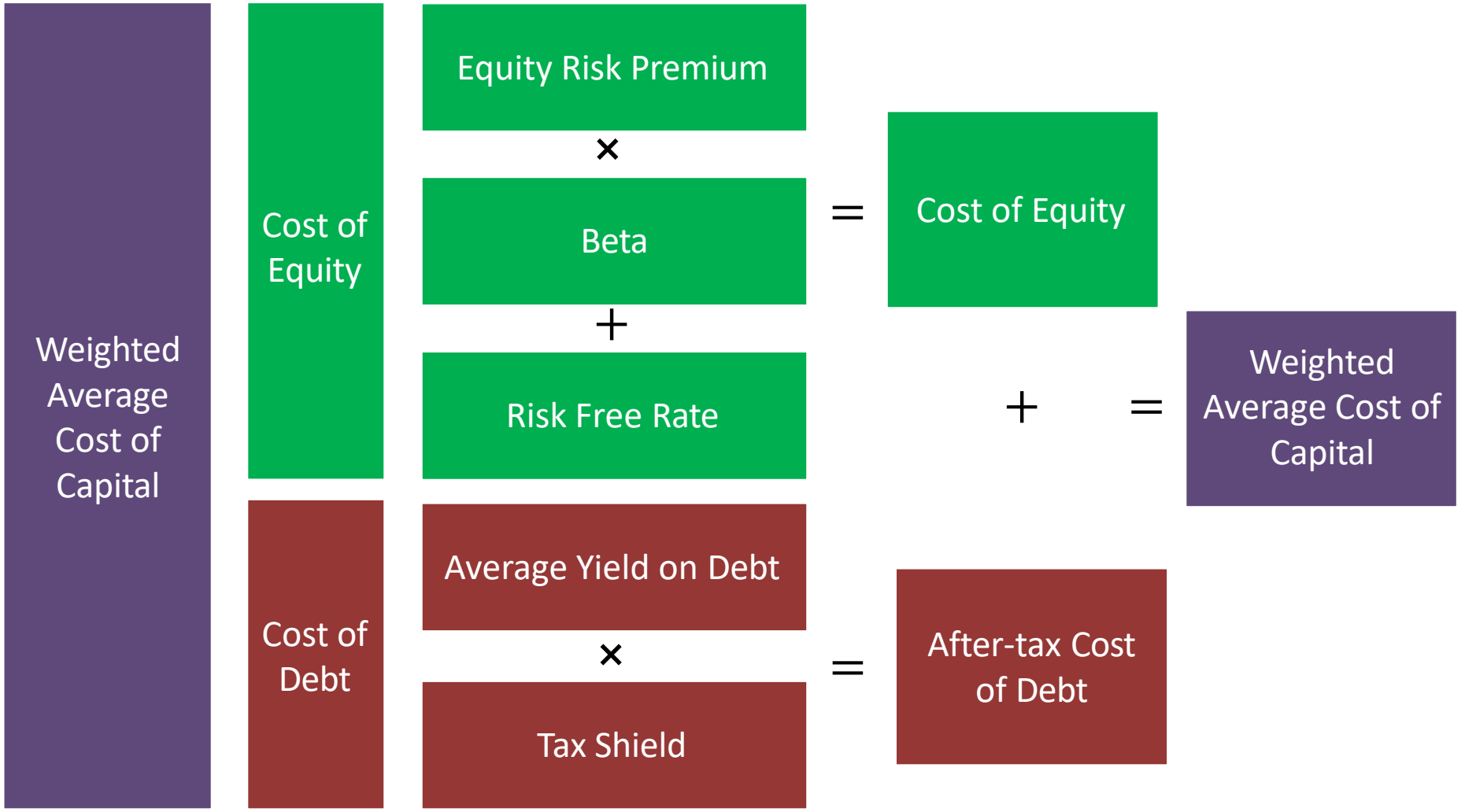
- Critical ingredient in discounted cashflow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.

- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.

- The **Cost of Equity** is the rate at which we discount cash flows to equity (dividends or free cash flows to equity). The **Cost of Capital** is the rate at which we discount free cash flows to the firm.

Intrinsic Valuation: DCF

II. Discount Rates



Intrinsic Valuation: DCF

II. Discount Rates – Cost of Equity, K_e

- The Cost of Equity, K_e is the rate of return that investors require from an equity investment in a firm.

- The 2 approaches to estimating K_e:

1. The risk and return approach – CAPM
2. Dividend growth approach

$$K_e = RFR + \beta * (ERP)$$

$$K_e = \frac{DPS_1}{(P_0 + g)}$$

Discount Rates

1) Cost of Equity, K_e – CAPM

- The risk and return approach – CAPM

$$\boxed{K_e = RFR + \beta * (ERP)}$$

1. **Risk Free Rate**
   3 proxies to estimate the Risk Free Rate:
   a) Historical Short Term Government security rate
   b) Current Short Term Government security rate
   c) Long term government bond

2. **Equity Risk Premium (ERP)**
   3 Factors that determine size of premiums:
   a) Structure of Market
   b) Political Risk
   c) Variance in underlying economy

Discount Rates

1) Cost of Equity, K_e – CAPM

- The risk and return approach – CAPM

$$K_e = RFR + \beta * (ERP)$$

3. Beta

3 Variables that determine beta:

a) Type of business
b) Degree of Operating Leverage
c) Company's Financial Leverage

Unlevered Beta = Levered Beta ÷ [1 + (1 – Tax Rate) × ($\frac{Debt}{Equity}$)]

Levered Beta = Unlevered Beta × [1 + (1 – Tax Rate) × ($\frac{Debt}{Equity}$)]

Example
Calculate equity beta

- The following information on Company ABC is shown:
  - Current Beta 0.75
  - Debt : Equity ratio 20%
  - Tax Rate 25%

- Calculate equity beta if Company ABC increases D:E to i) 30% and ii) 50%

Discount Rates

2) Cost of Equity, K_e – Dividend Growth Model

- PV of CF to equity can be expressed as:

$$P_o = Present\ value\ of\ expected\ dividends$$
$$= \frac{DPS_1}{(ke - g)}$$

where,

- P_0 = Current price of the share
- DPS_1 = Expected dividends per share next year
- k_e = Cost of Equity
- g = Steady growth rate in dividends

- Cost of Equity:

$$V_0 = \frac{D_1}{r - g}$$
$$r = \frac{D_1}{P_0} + g$$

Intrinsic Valuation: DCF

II. Discount Rates – Weighted Average Cost of Capital, WACC

- The cost of capital for a company refers to the required rate of return which investors demand.
- It is the average-risk investment of a company.
- It is usually estimated by computing the marginal cost of each of the various sources of capital for the company and then taking a weighted average of these costs.

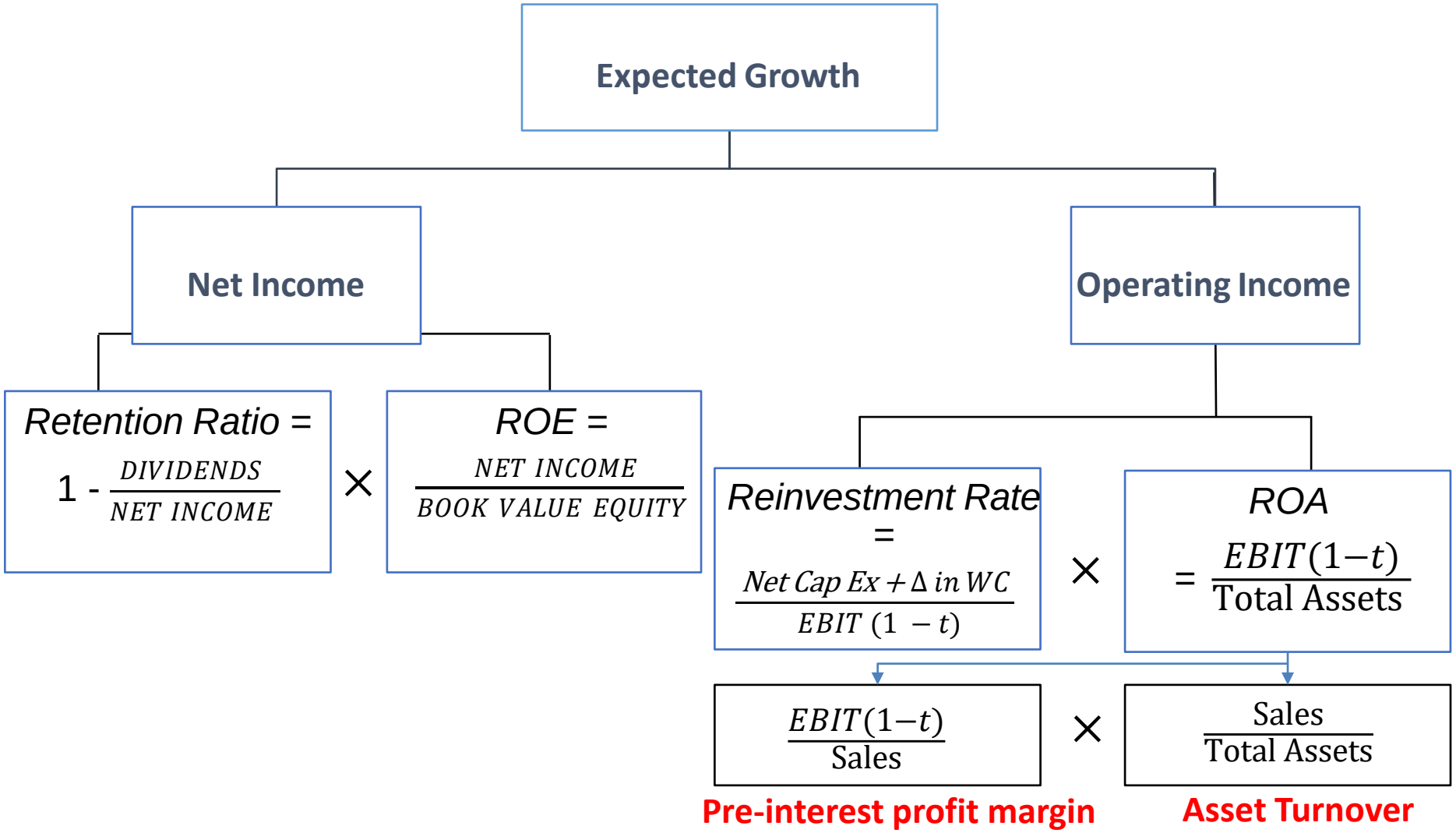
$$\text{WACC} = \frac{E}{(D+E)}(K_e) + \frac{D}{(D+E)}(Kd)(1-t)$$

Example:

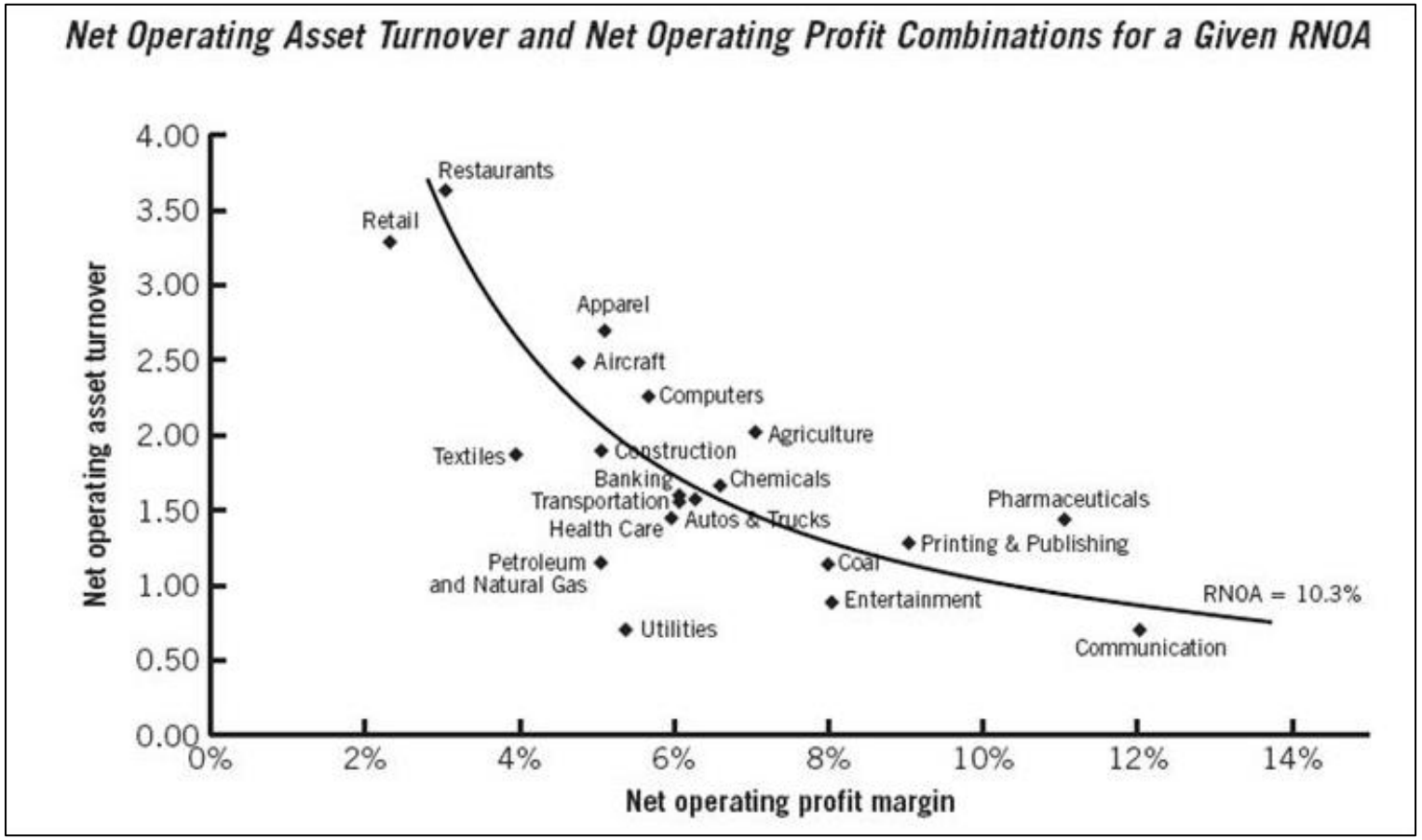
What is the weighted average cost of capital for a company if it has the following capital structure: 30% equity, 20% preferred stock, and 50% debt. Its marginal cost of equity is 11%, its marginal cost of preferred stock is 9%, its before-tax cost of debt is 8%, and its marginal tax rate is 40%?

Intrinsic Valuation: DCF

III. Expected Growth



Plot of Median Profit Margin and Asset Turnover by Industry



This figure plots 248 three-digit SIC industry groups from 1970-2001. The points represent median profit margin and median asset turnover by industry. The Iso-RNOA line represents the profit margin and asset turnover combination that would result in an RNOA of 14%.

Source: Soliman (2003)

Source: Soliman (2003)

Intrinsic Valuation: DCF

III. Expected Growth

$$\text{Sustainable growth rate} = \text{Retention Ratio} \times \text{ROE}$$

$$\text{Retention Ratio} = 1 - \frac{\text{Dividends}}{\text{Net Income}}$$

$$\text{ROE} = \frac{\text{Net Income}}{\text{Book Value Equity}}$$

Year	Sales	Capex - Maintenance	Capex - Expansion	Basic EPS	DPS	Capex to sales (%)
2013A	4,265	597	316	8.03	4.00	21%
2014A	4,791	828	128	8.62	9.00	20%
2015A	5,231	313	164	9.99	11.00	9%
2016A	5,475	55	565	11.83	12.00	11%
2017A	5,613	392	17	11.98	12.50	7%
2018A	5,531	381	56	14.80	12.50	8%
Total	30,906	2,566	1,247	65.24	61.0	12%

Year	Dividend payout ratio	Retention Ratio (b)	ROE (%)	Est Growth Rate = b × ROE	YoY EPS Growth (%)	3-yr EPS CAGR (%)
2013A	50%	50%	82%	**41%**	-33%	14%
2014A	105%	-5%	73%	**-3%**	7%	12%
2015A	110%	-10%	75%	**-8%**	16%	14%
2016A	102%	-2%	102%	**-2%**	18%	-9%
2017A	105%	-5%	100%	**-5%**	1%	-5%
2018A	85%	15%	118%	**18%**	24%	-13%
Total	93%	7%	92%	**7%**	5%	

Intrinsic Valuation: DCF

IV. Getting closure in Valuation: Terminal Value

- Since we cannot estimate cash flows forever, we estimate cash flows for a “growth period” and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} + \frac{Terminal\ Value}{(1+r)^N}$$

- When a firm’s cash flows grow at a “constant” rate forever, the present value of those cash flows can be written as:

$$\text{Value} = \frac{Expected\ Cash\ Flow\ Next\ Period}{(r-g)}$$

where

- r = Discount rate (Cost of Equity or Cost of Capital)
- g = Expected growth rate forever

- This “constant” growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.

Putting it all together: Dividend Discount Model (DDM)

Example: Multiperiod DDM

$$V_0 = \sum_{t=1}^{n} \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$$

Example

- For the next 3 years, **expected** annual dividends of stock X are
  - Yr 1:$1
  - Yr 2:1.10
  - Yr 3:1.20
  - The expected stock price of year 3 is expected to be $20. The required rate of return on the shares is 10%. What is the Estimated Value?

Putting it all together: Infinite Period DDM

Valuing Common Stock Using the Gordon Growth Model

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

- The long-term (constant) growth rate is usually calculated as: g_c = RR × ROE
- The Gordon growth model is highly appropriate for valuing dividend-paying stocks that are relatively immune to the business cycle and are relatively mature (e.g., utilities).

Example: GGM with No current dividend

- A company does not currently pay dividend but expected to do so in 4 years.
- The 1st dividend is expected to be $2.00 and to be received at end of Yr $4. The dividend is expected to grow at 5% into perpetuity.
- The required rate of return in 10%. Estimate current intrinsic value.

Putting it all together: Infinite Period DDM

Example Multistage Dividend Discount Model

Example

- The current dividend is $4.00. Growth is expected to be 20% a year for 4 years and then 10% after that.
- The required rate of return in 18 %. Estimate current intrinsic value.

Putting it all together: Multistage Free Cash Flow method

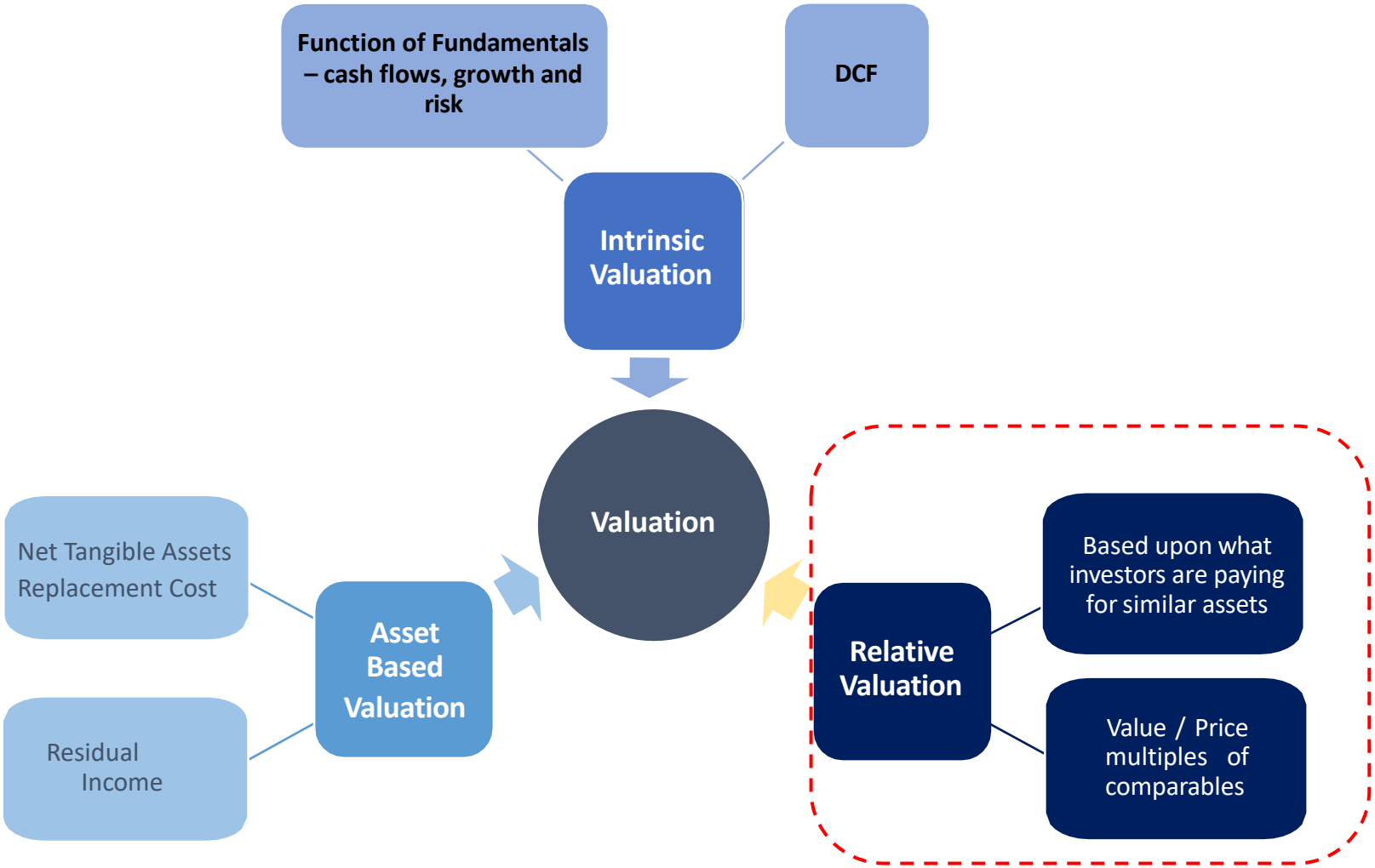
Example

Mohammad Ali is preparing a valuation of QuickChange Auto Centers Bhd. Ali has decided to use a multistage-stage FCFE valuation model and the following estimates.

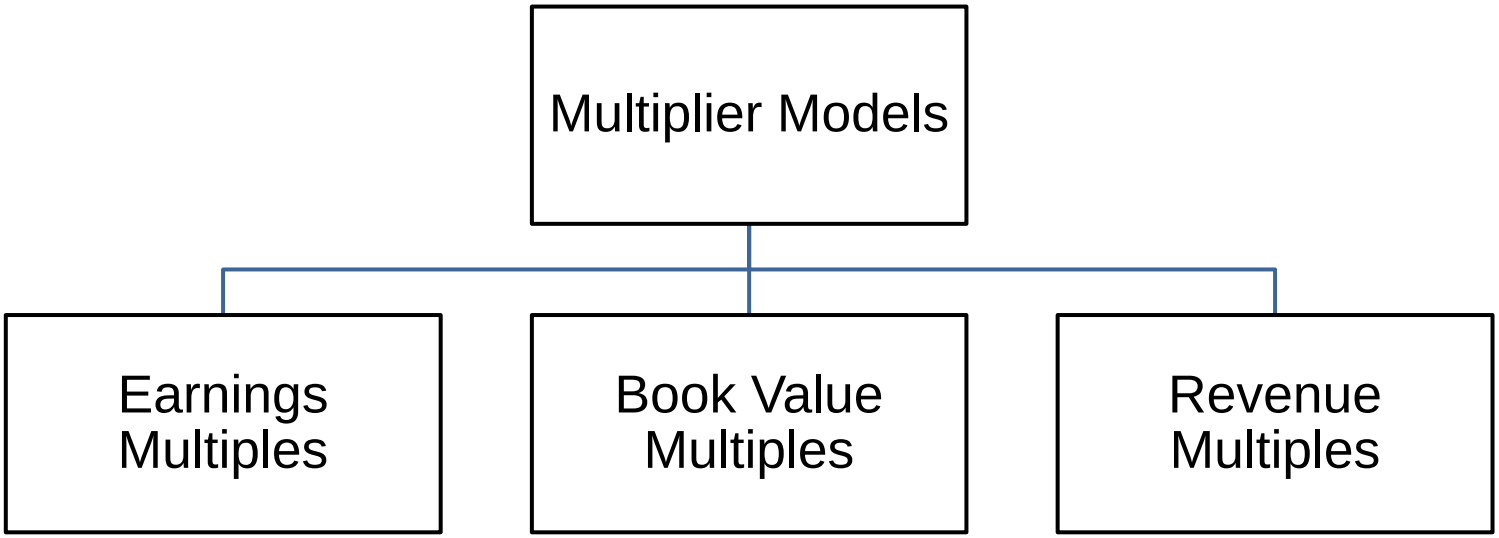
- The FCFE per share for the current year is $0.75.
- The FCFE is expected to grow at 10% for next year, then at 26% annually for the following three years, and then at 6% in Year 5 and thereafter.
- QuickChange's estimated beta is 2.00 and;
- Ali believes that current market conditions dictate a 4.5% risk-free rate of return and a 5.0% equity risk premium.

1. Given Ali's assumptions and approach, estimate the **value of a share of QuickChange**.

3 approaches to valuation



Relative Valuation
Multiplier Models

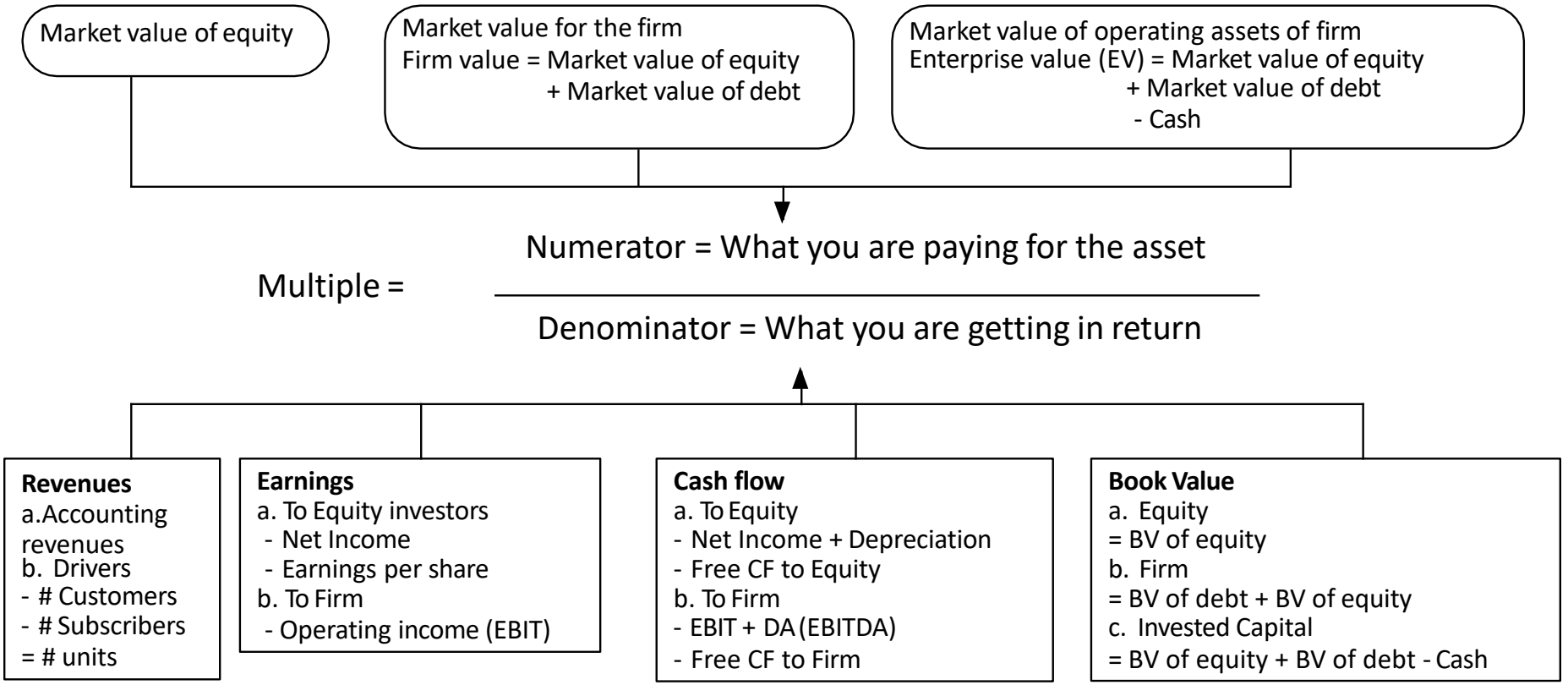


The Essence of Relative Valuation (Pricing)

Relative valuation is pervasive…

- In relative valuation, the value of an asset is **compared to the values assessed by the market for similar or comparable assets.**
- Most asset valuations are relative.
- **Most sell side equity valuations are relative valuations.** Almost 85% of equity research reports are based upon a multiple and comparables. More than 50% of all acquisition valuations are based upon multiples.
- Rules of thumb based on multiples are not only common but are often the **basis for final valuation judgments.**
- While there are more discounted cashflow valuations in consulting and corporate finance, they are often relative valuations **masquerading as discounted cash flow valuations**.
- The objective in many discounted cashflow valuations is to back into a number that has been obtained by using a multiple.
- The terminal value in a significant number of discounted cashflow valuations is estimated using a multiple.

Multiples are just standardized estimates of price…



Price-to-Earnings Multiple
Rationales and Drawbacks

Rationales

- EPS is driver of value
- Widely used
- Related to stock returns

Drawbacks

- Zero, negative, or very small earnings
- Permanent versus transitory earnings
- Management discretion for earnings

Justified P/E from Fundamentals
Forward and Trailing

- Justified Forward P/E

$$V_0 = \frac{D_1}{r-g}$$

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{r-g}$$

$$\frac{P_0}{E_1} = \frac{1-b}{r-g}$$

Where:

- P_0 = current share price
- V_0 = current value per share
- D_1 = expected dividend per share in one year
- E_1 = expected earnings per share in one year
- r = shareholders' required rate of return
- g = constant growth rate in dividends

- Justified Trailing P/E

$$V_0 = \frac{D_0(1+g)}{r-g}$$

$$\frac{P_0}{E_0} = \frac{D_0(1+g)/E_0}{r-g}$$

$$\frac{P_0}{E_0} = \frac{(1-b)(1+g)}{r-g}$$

Where:

- P_0 = current share price
- V_0 = current value per share
- D_0 = current dividend per share
- E_0 = current earnings per share in one year
- r = shareholders' required rate of return
- g = constant growth rate in dividends

Justified Forward P/E
Example

Example

- Between 2008 and 2012, a company's dividend payout ratio has been 40% on average.
- In 2008, the dividend was $1.00 and has grown steadily to $1.80 for 2012.
- This growth rate is expected to continue in the future. Using a discount rate of 20%, estimate the company's justified forward P/E.

Price to Earnings Ratio

Advantages vs Disadvantages

Advantages

- Earnings are key drivers of stock value.
- The ratio is simple to calculate and widely used in the industry.
- According to empirical research, differences in P/E ratios are significantly related to long-term stock returns.

Disadvantages

- Companies that make losses have negative EPS and P/Es which are useless as far as relative valuation is concerned.
- Earnings of some companies are very volatile, which makes the task ofdetermining a fundamental stock value very challenging.
- Management can use different accounting assumptions to prepare their financial statements. This reduces the comparability of P/E ratios across companies.

Price to Book Value Ratio

- Book value per share (BVPS) attempts to represent the investment that common shareholders have made in the company.
- There is only a current P_0/B_0, not a leading P/B!

Advantages

- Book value usually remains positive even when the company reports negative earnings.
- Book value is typically more stable over time compared to reported earnings.
- For financial sector companies that have significant holdings of liquid assets, P/BV is more meaningful, as book values reflect recent market values.
- P/BV is useful in valuing a company that is expected to go out of business.

Disadvantages

- Book values ignore nonphysical assets such as the quality of a company's human capital and brand image.
- P/BV can lead to misleading valuations if significantly different levels of assets are being used by the companies being studied.
- Book values of assets are based on historical cost adjusted for accumulated depreciation. However over time, inflation/changes in technology result in significant differences between accounting book values and actual values of company's assets.

Price to Sales Ratio

Advantages vs Disadvantages

Advantages

- Sales are less prone to manipulation by management than earnings and book values.
- Sales are positive even when EPS is negative.
- The P/S ratio is usually more stable than the P/E ratio.
- Price to sales is considered an appropriate measure for valuing mature, cyclical, and loss-making companies.

Disadvantages

- Using sales reveals no information about the operating profitability of a company.
- Ultimately, a company derives its value from its ability to generate profits.
- Using the P/S ratio does not reflect the differences in cost structure and operating efficiency between companies.
- Revenue recognition practices may allow management to distort revenue figures.

Asset Based Valuation

What is asset based valuation?

What is asset based valuation?

- In intrinsic valuation, you value a business based upon the cash flows you expect that business to generate over time.
- In relative valuation, you value a business based upon how similar businesses are priced.
- In asset based valuation, you value a business by valuing its individual assets. These individual assets can be tangible or intangible.

Why asset based valuation?

- **Liquidation:** If you are liquidating a business by selling its assets piece meal, rather than as a composite business, you would like to estimate what you will get from each asset or asset class individually.
- **Accounting mission:** As both Malaysian and international accounting standards have turned to “fair value” accounting, accountants have been called upon to redo balance sheet to reflect the assets at their fair rather than book value.
- **Sum of the parts:** If a business is made up of individual divisions or assets, you may want to value these parts individually for one of two groups:
  - Potential acquirers may want to do this, as a precursor to restructuring the business.
  - Investors may be interested because a business that is selling for less than the sum of its parts may be “cheap”.

Asset Based Valuation

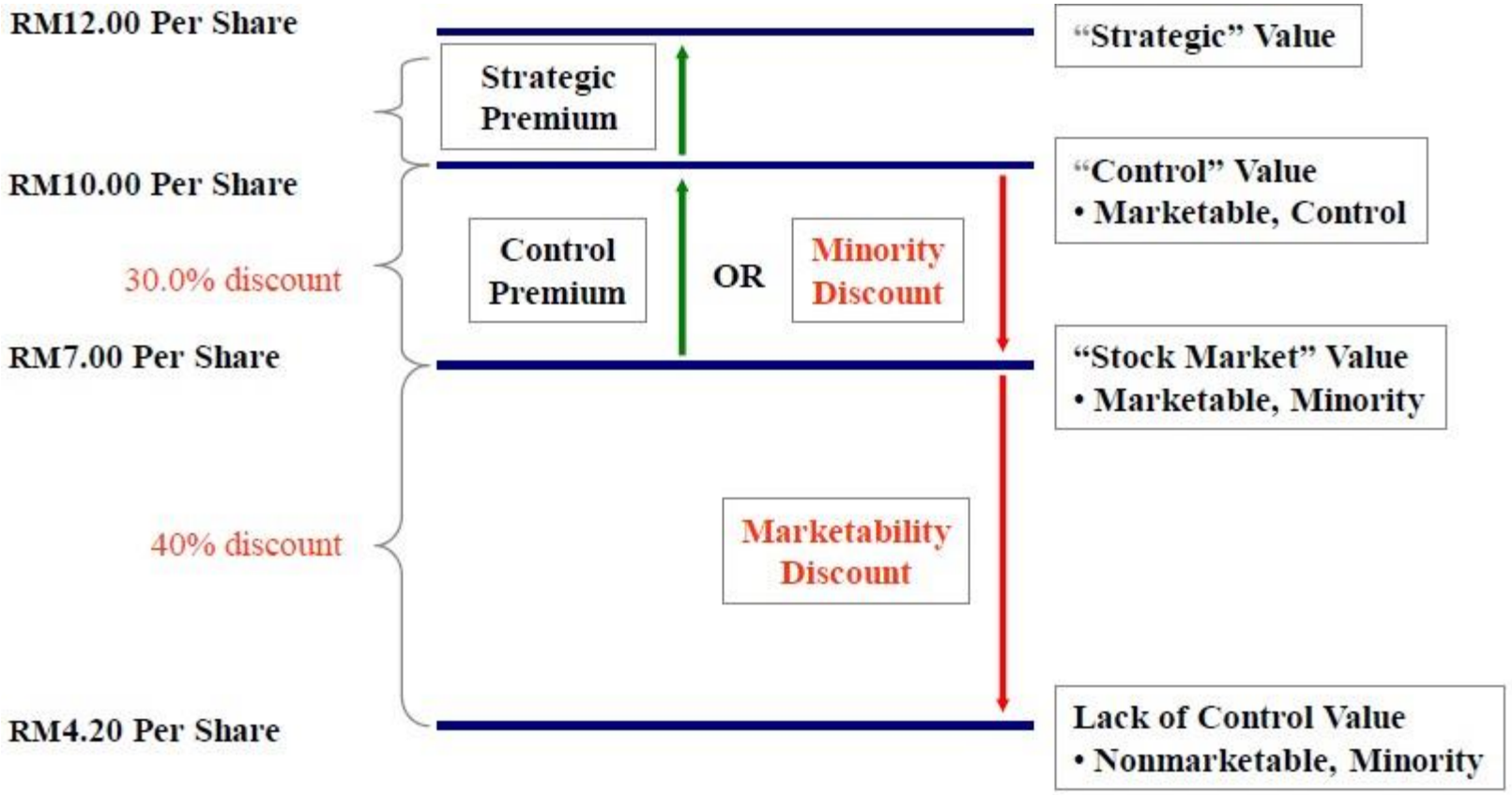
How do you do asset based valuation?

- **Intrinsic value:** Estimate the expected cash flows on each asset or asset class, discount back at a risk adjusted discount rate and arrive at an intrinsic value for each asset.

- **Relative value:** Look for similar assets that have sold in the recent past and estimate a value for each asset in the business.

- **Accounting value:** You could use the book value of the asset as a proxy for the estimated value of the asset.

Premium & Discount Considerations



Note: A combined 30% minority discount and 40% marketability discount equals 58% discount from value of control shares.

Topic 13-15: Derivatives

Contents

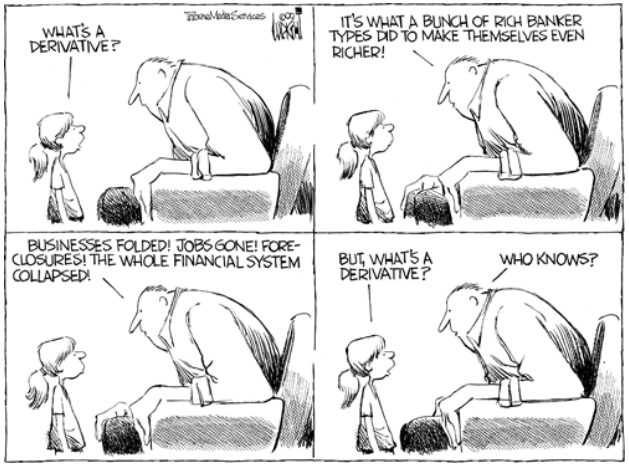
- **Derivatives Markets and Instruments**

- **Basics of Derivative Pricing and Valuation**
  a) Forward Markets and Contracts
  b) Futures Markets and Contracts
  c) Swap Markets and Contracts
  d) Option Markets and Contracts

- **Risk Management Applications of Option Strategies**

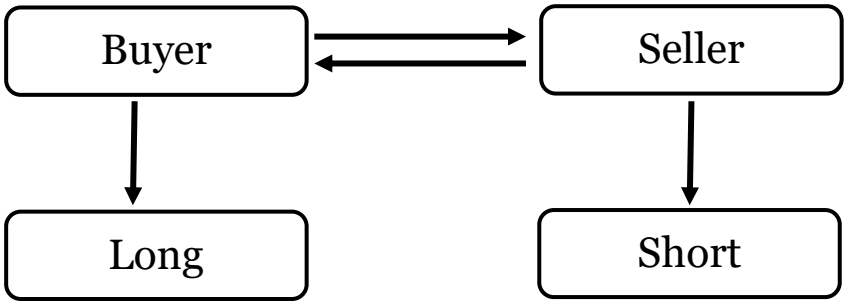
Derivatives Markets and Instruments

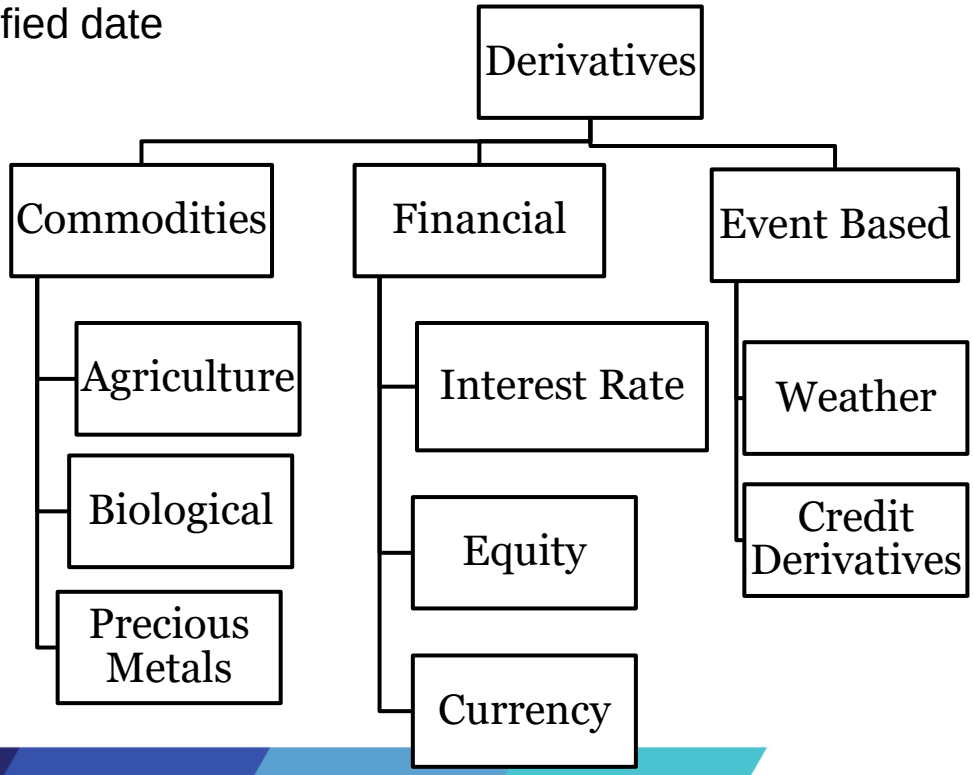
1) Derivatives: Definitions and Uses
2) The Structure of Derivative Markets
3) Types of Derivatives
4) The Purposes and Benefits of Derivatives
5) Criticism and Misuses of Derivatives



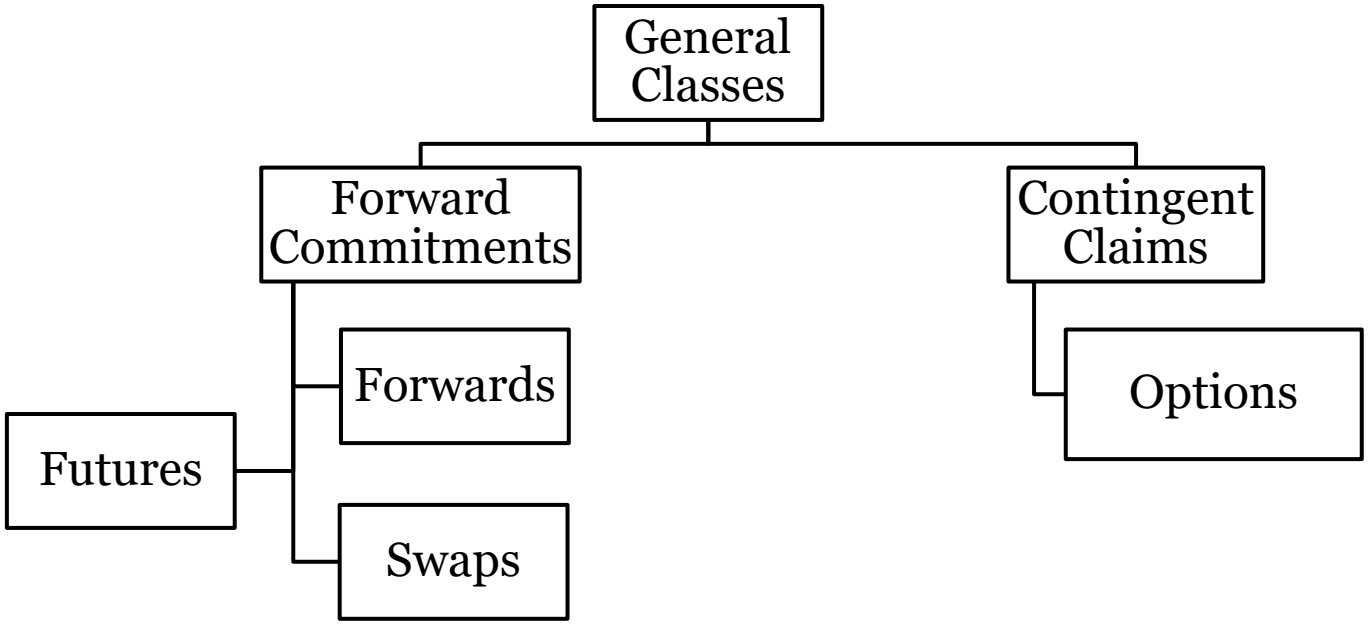
Derivatives: Definitions and Uses

- Derivative: a financial instrument that **derives** its performance from the performance of an underlying asset.
- Derivatives are similar to insurance in that both allow for the transfer of risk from one party to another.
- Other similarities:
  1. Specifies the underlying risk
  2. Definite life span and expires on a specified date





Derivatives: Definitions and Uses



- Uses:
  - Create strategies that cannot be implemented with the underlying alone
  - Allows leverage
  - Lower transaction costs, more liquid, therefore efficient way to transfer risk
  - More effective **risk management**

Structure of Derivative Markets

Exchange traded vs Over-the-Counter (OTC)

Exchange Traded

- Exchange-traded derivatives are **standardized contracts** issued by exchanges, that also act as clearinghouses.
- They trade in accordance with rules and specifications prescribed by the derivatives exchange and are usually subject to governmental regulation.
- Minimal default risk

Advantages:

1) **Liquidity** - market more efficient than if derivatives had many different sizes/ expiration days
2) **Facilitates** clearing and settlement
3) **Transparency** – full information disclosed

Disadvantages:

1) **Basis risk** – imperfect hedging
2) **Cashflow liquidity risk** – due to margining system

Over-the-Counter

- Comprises of an *informal* network of market participants that are willing to create and trade virtually any type of derivative that can legally exist.
- Dealer market

Advantages:

1) **Customization** – allows more efficient matching of risk factors
2) **Less regulation** - OTC derivative markets operate at a lower degree of regulation and oversight

Disadvantages:

1) **Counterparty risk**
2) **Legal Risk**

Types of Derivatives

Forwards

An OTC derivative contract in which two parties agree that the buyer, will purchase an underlying asset from the seller, at a later date at a agreed upon fixed price when the contract was signed.

Key features:

1) OTC therefore customised
2) Counterparty risk present
3) No payment needed to initiate the contract

Futures

A standardized derivative contract traded on a futures exchange in which two parties agree that the buyer, will purchase an underlying asset from the seller, at a later date, at an agreed upon price and in which there is a daily settling of gains and losses and a credit guarantee by the futures exchange through its clearinghouse.

Key features:

1) Standardized
2) Minimal Default risk
3) Daily MTM (subject to margin call)

Swaps

An OTC derivative contract in which two parties agree to exchange a series of cash flows whereby one party pays a variable series determined by an underlying asset or rate and the other party pays *either* a variable series determined by a different underlying asset *or* rate or a fixed series.

Key features:

1) Series of forward contracts
2) Customised
3) Counterparty risk
4) No initial payment

Options

A derivative contract in which the buyer, pays a sum of money to the writer, and receives the right to either buy or sell an underlying asset at a fixed price *either* on a specific expiration date *or* at any time prior to the expiration date

Key features:

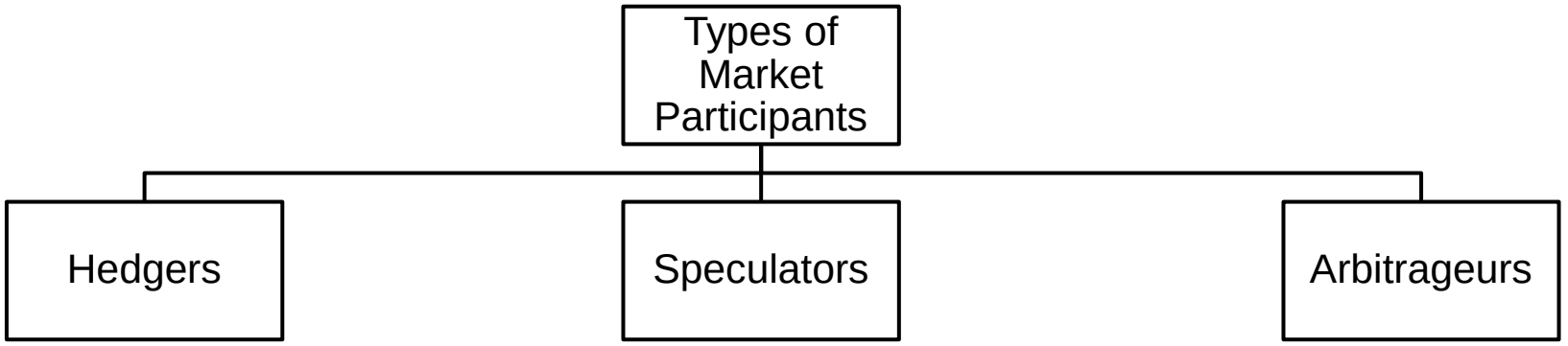
1) Can be OTC or exchange traded
2) Requires payment to seller (option premium) at initiation

The Benefits and Criticisms of Derivatives

Benefits	Explanation
Risk Allocation, Transfer, and Management	• Transfer risk: Derivatives allow trading the risk without trading the instrument itself. • Risk allocation: Risk allocation is improved within markets and, indeed, the entire global economy.
Information Discovery	• Price Discovery
Operational Advantages	• Lower transaction cost: low relative to the value of the underlying • Makes short selling easier
Criticisms	
Speculation and Gambling	• Because of the high leverage payoff and naïve speculation
Destabilization and Systemic Risk	• Defaults by speculators can turn systemic (LTCM, GFC 2008/09) • Due to its complexity, especially to those with limited knowledge

Elementary Principles of Derivative Pricing

Concept of Arbitrage



Enter the market to mitigate risks exposures arising from an underlying position by taking opposing exposures.

Seek to gain by assuming risk exposures in anticipation of favourable price or value change.

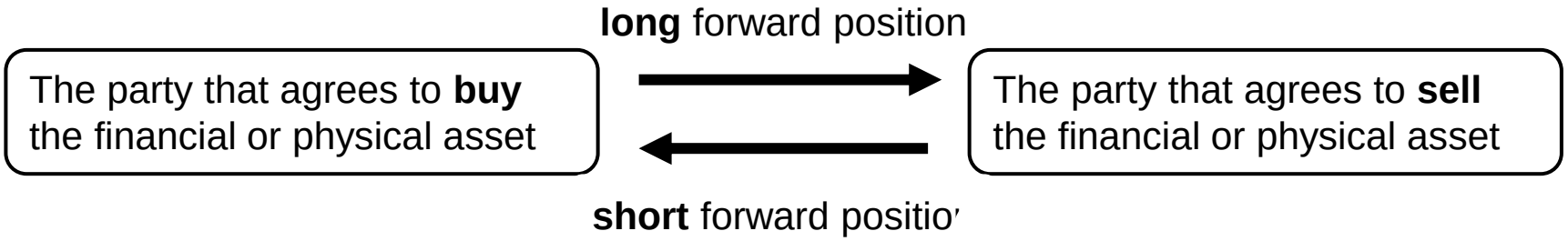
Simultaneously enter a long and short position to locked in a riskless profit.

- It is a process of generating riskless profit by taking at least 2 positions
- Arbitrage opportunities arise when assets are mispriced
- **Law of One Price (LOOP)**: Two assets or combination of assets with similar characteristics (risk and return) should be traded at a same price. If the relationship does not hold, there is arbitrage opportunity.
- The combined actions of many investors engaging in arbitrage results in rapid price adjustments that eliminate these opportunities, thereby bringing prices back in line and making markets more efficient.

Forward Markets and Contracts

1) Introduction
2) Key Concepts
3) Types of Forward Contracts

Introduction



The holder of a **long** forward contract is obligated to take delivery of the underlying asset and pay the forward price at expiration.

The holder of a **short** forward contract is obligated to deliver the underlying asset and pay the forward price at expiration.

Key Features:

- An important element of forward contracts is that no money changes hands between parties when the contract is initiated. Unlike in the purchase and sale of an asset, there is **no value exchanged at the start**.
- The buyer does not pay the seller some money and obtain something. In fact, forward contracts have zero value at the start. They are neither assets nor liabilities. Their values will deviate from zero later as prices move.
- Forward contracts will almost always have non-zero values at expiration.
- Finally, forward contracts need not specifically settle by delivery of the underlying asset. They can settle by an exchange of cash. These contracts-called non-deliverable forwards (NDFs), cash-settled forwards, or contracts for differences-have the same economic effect as do their delivery-based counterparts.

Introduction
Illustration

Long Position: Top Glove Corp

Short Position: Rubber Berhad

- Top Glove enters into a forward contract to purchase 1 ton of latex from Rubber Berhad at an agreed upon price of RM7,000 in 6 months.

Illustration

Scenario 1: 6 months later

- Scenario 1: Assume rubber trades at RM7,500 per ton at the end of 6 months?
- The contract can be settled in 2 ways:

Physical Delivery (Deliverable)	Cash Settlement
▪ Rubber Bhd deliver 1 ton of rubber that is now worth RM7,500 to Top Glove for RM7,000 ▪ Top Glove has a positive payoff of RM500 and Rubber Berhad has a negative payoff of similar amount.	▪ No physical delivery. Rubber Berhad will pay the difference between current market price of rubber and agreed upon price with Top Glove ▪ (RM7,500 – RM7,000=RM500) ▪ +RM500 is the value of forward contract to Top Glove and –RM500 to Rubber Berhad at the end of 6 months

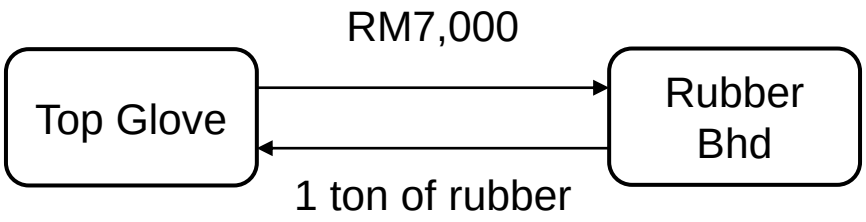
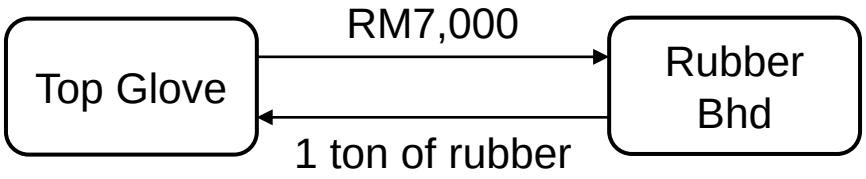


Illustration
Scenario 2: 6 months later

- Scenario 2: Assume rubber now trades at RM6,500 per ton at the end of 6 months?

Physical Delivery (Deliverable)	Cash Settlement
▪ Rubber Bhd deliver 1 ton of rubber that is now worth RM6,500 to Top Glove for RM7,000 ▪ Top Glove now has a negative payoff of RM500 and Rubber Berhad has a positive payoff of similar amount.	▪ No physical delivery. Top Glove will pay the difference between current market price of rubber and agreed upon price with Rubber Bhd. ▪ (RM6,500– RM7,000= -RM500) ▪ +RM500 is the value of forward contract to Rubber Bhd and –RM500 to Top Glove at the end of 6 months.



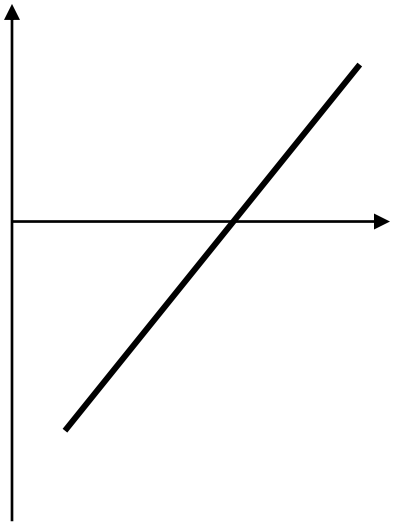
- Conclusion: **Zero sum game!**

Key Concept
Forward Payoffs

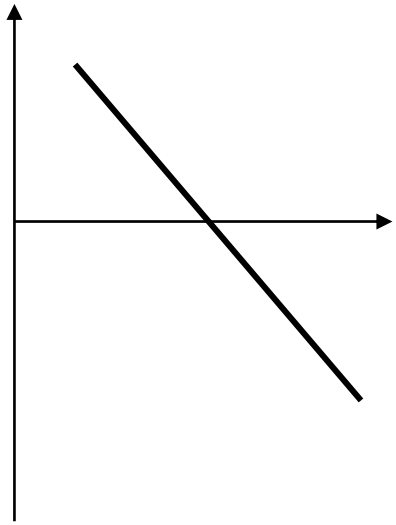
- The long hopes the price of the underlying will rise above the forward price, $F_o(T)$, whereas the short hopes the price of the underlying will fall below the forward price.

- Derivatives pricing relies heavily on the principle of **storage**, meaning the ability to hold or store the underlying asset. Storage can incur costs but can also generate cash, such as dividends and interest.

$$F_o = S_o + \text{carrying costs}$$



Long Position



Short Position

Key Concept

Default risk and Termination of Forward Contract

Default Risk

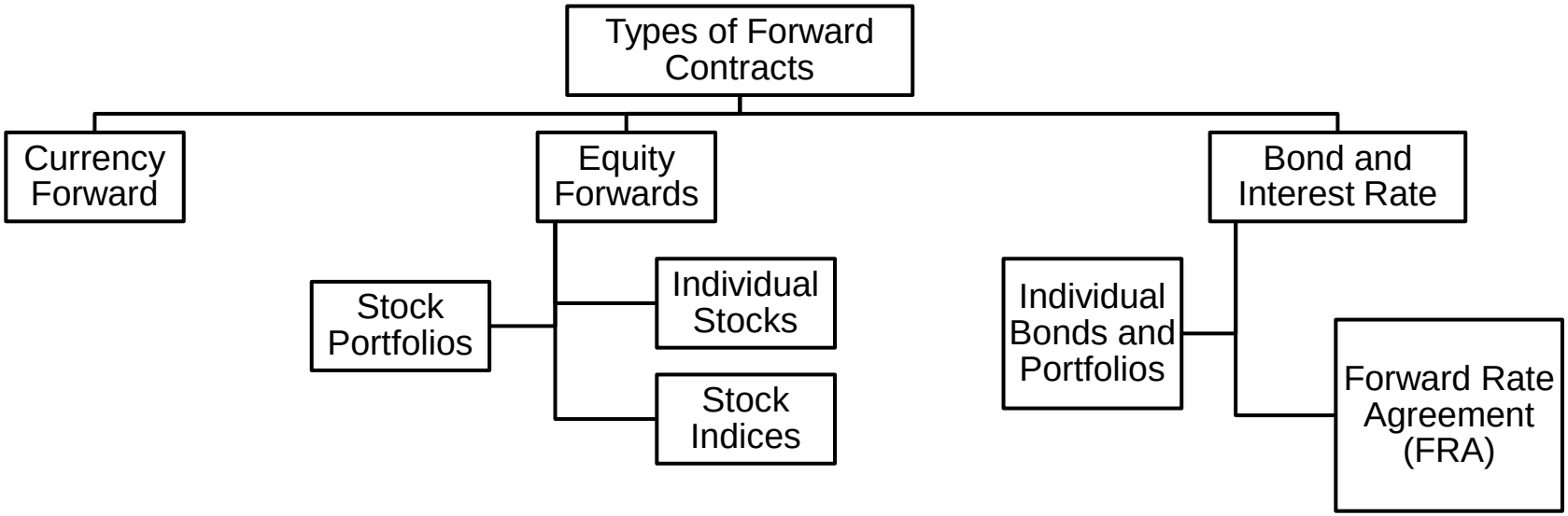
- An important characteristic of forward contracts is that they are subject to default. Regardless of whether the contract is for delivery or cash settlement, the potential exists for a party to default.

Termination Prior to Expiration

- A party can terminate the forward contract position prior to expiration by entering into an opposite forward contract position with an expiration date equal to time remaining on the original position with either:
  1. **The same counterparty**
     - E.g 2 months after initiation, 4 month forward price of 1 ton of rubber is RM6,700. Top Glove would like to unwind its original long forward position. Top Glove will take a 4 month short forwards position with Rubber Berhad for RM6,700.
     - Top Glove will realise a loss of RM300, but has effectively exited the original position.
  2. **Another counterparty**
     - Same as above but with Kumpulan Getah instead.

- The key difference between the 2 is **credit risk.** By entering the opposite position with another party, Top Glove exposed itself to the credit risk of Kumpulan Getah.

Types of Forward Contracts



Equity Forwards

- ***Effect of Dividends:-** Equity forward contracts typically have **payoffs based only on the price** of the equity, value of the portfolio, or level of the index.
- **Exception** is if based on **total return** indices.
- Not so important in risk management because the **variability of prices is so much greater** than the variability of dividends.

Bond/Interest Rate Forwards

Difference between Bonds and Stock Forwards:

- Bond = coupon, Stocks = Dividends
- Maturity
- Special features – Calls, Convertibility
- Default risk
- The primary bonds we consider forward contracts for are default-free zero-coupon bonds (T-bills) which are proxies for the risk-free rate.
- We also consider forward contracts on Treasury Bonds. Prices are often quoted by stating the yield.

Key Concept
Pricing of Forward Contract

- The fundamental principle for forward pricing is to distinguish the "**cost of carry**" between those that invest in the physical underlying and those that invest via a financial instrument. Under **(LOOP), NO arbitrage opportunity** between the 2 counterparties upon the initiation of the contract. Thus the **forward price** should be **based on the spot price and the carrying cost.**

$$F_0 = S_0(1 + \text{Carrying Cost})$$

If the current forward price is less than the theoretical forward price, arbitrage profit can be made via **cash and carry arbitrage** by simultaneously:

1. Borrow at risk free rate
2. Buy Physical Asset with the borrowed funds
3. Short the forward contract of the asset

T		T + 1 year	
Spot Price of Gold	$500		
Futures price of gold	$510		
Transactions	**Cash Flow**	**Transaction**	**Cash Flow**
Short Futures	$0	Settle short position by delivering gold	$510
Buy gold @ spot	-$500	Repay loan	-$507.34
Borrow at 7%	+$500		
Total CF	0	Total cash flow	+$2.66

Carrying Costs

1. Storage
2. Transportation
3. Insurance
4. **Interest Rate (Risk free) = Rf**
5. (Convenience Yield)*
6. Dividend Yield = -q

* Convenience Yield = nonmonetary return yielded by an asset when in short supply. When an asset is in short supply. Its price tends to be high

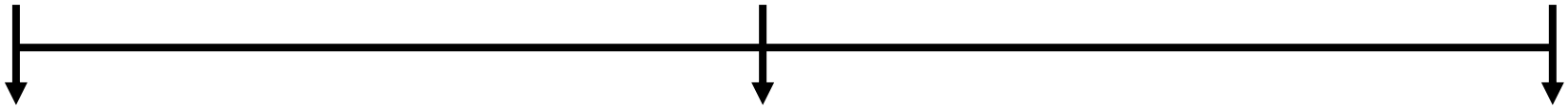
Basis = Spot Price – Futures Price
Spread = Diff between 2 existing forward contracts

Key Concept
Valuation of Forward Contract

- Being an irrevocable contract, the value of a forward contract is the **present value of its expected settlement value** upon expiry of the contract. For market contracts, the value of the forward contract at the initiation date would be zero.

$$\text{Value} = \frac{Expected\ Settlement}{(1+r)^n}$$

$$\text{Value}_t = \frac{F_t - F_0}{(1+rf)^{T-t}}$$



Initiation Date (0)	Reporting Date (t)	Expiration Date (T)
$\text{Price}, F_0 = S_0(1+c)^T$ $\text{Value}_0 = 0$	$\text{Price}, F_t = S_t(1+c)^{T-t}$ $\text{Value}_t = \frac{F_t - F_0}{(1+rf)^{T-t}}$	$\text{Value}_T = S_T - F_0$

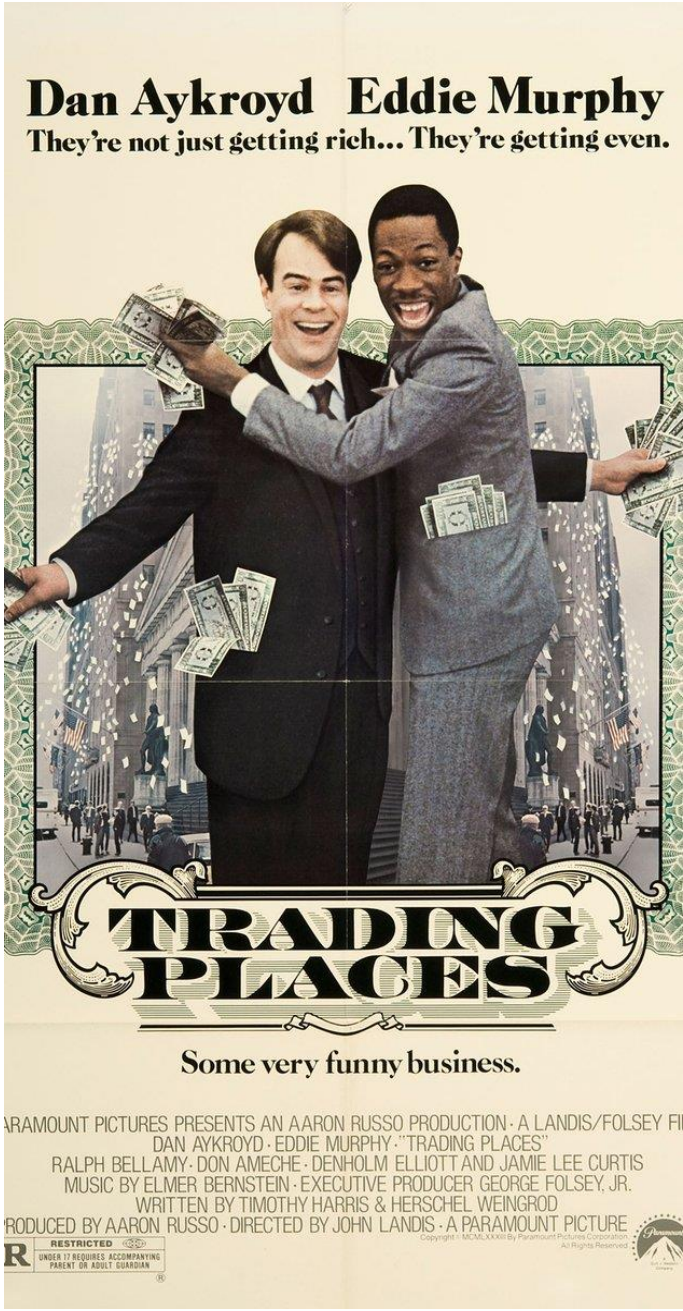
$F_0 = S_0 e^{(\text{continuous rate})t}$

$F_0 = S_0(1+ \text{discrete rate})^t$

Continuous rate = ln(1+ discrete)

Futures Markets and Contracts

1) Introduction
2) Forwards vs Futures



Introduction
Key Features

- A futures contract is an **agreement between two parties** in which one party, the buyer, agrees to buy from the other party, the seller, an underlying asset or other derivative, at a **future date** at a **price agreed on today**.
- **Key Features:**

1. **Public Standardized Transactions**
   - A futures transaction is reported to the futures exchange, the clearinghouse, and at least one regulatory agency.
   - Only price established by the two parties; the exchange establishes all other terms (eg expiration dates, specific/grade of asset, contract size)

2. **Homogenization and Liquidity**
   - By creating contracts with generally accepted terms, **the exchange** standardizes the instrument.
   - Standardizing the instrument makes it more acceptable to a broader group of participants, with the advantage being that the instrument can then more easily trade in a type of secondary market.

3. **The Clearing House, Daily Settlement, and Performance Guarantee**
   - Clearing house: Mechanism in which futures exchange guarantees to each party the performance of the other party.
   - Daily Settlement: Gains and losses on each party's position are credited and charged on a daily basis.

4. **Regulation**
   - In most countries, futures contracts are regulated at the federal government level.

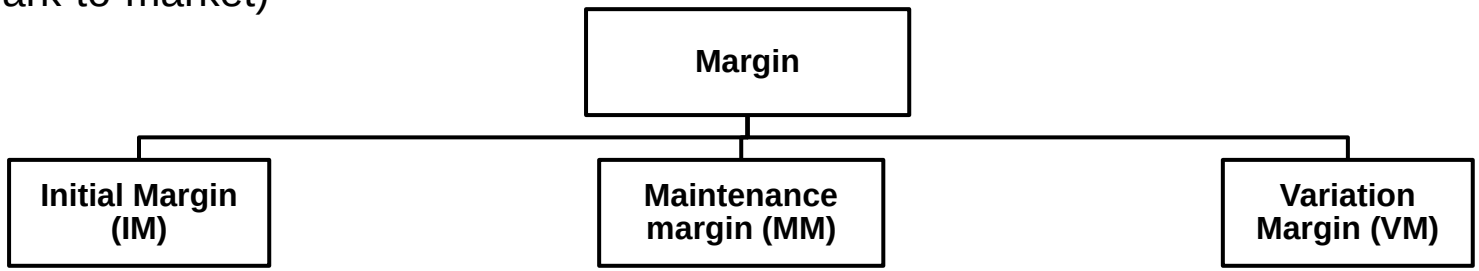
Introduction
Forwards vs Futures

- Futures contracts are very similar to forward contracts. Both has zero value at the inception and can be settled via physical delivery or cash. However there are key differences between the two.

Characteristic	Futures	Forward
Market	Exchange-traded	OTC. Private contracts and do not trade
Contract Terms	Standardized	Customized
Counterparty	Clearinghouse	Originating Counterparty
Regulation	Highly regulated	Usually not regulated
Default Risk	Non-existent	Exist
Initial Margin	Yes	No
Daily mark-to-market	Yes	No

Margin Requirement

- Each exchange has a clearinghouse to serve as counterparty for each trader and to ensure the performance of the contracts. To safeguard the clearinghouse, the exchange requires traders to post initial margin (performance guarantee) and settle their account on a daily basis (mark-to-market)



- Money that must be deposited in the futures account before any trading takes place
- Determined by the clearing house

- Amount that must be maintained in the futures account
- If the account balance fall below MM, additional fund needed to bring the balance back to IM level

- Fund that must be deposited into account to bring it back to IM level
- VM = (current account balance – IM requirement)
- Extra VM can be withdrawn or used as IM for additional position

Characteristic	Futures Market	Securities Market
Initial Margin	Collateral/performance guarantee, no interest charge	Loan with Interest Charge
Current Acc Balance < MM	Top up to bring it back to **IM** level	Top up to bring it back to **MM** level only

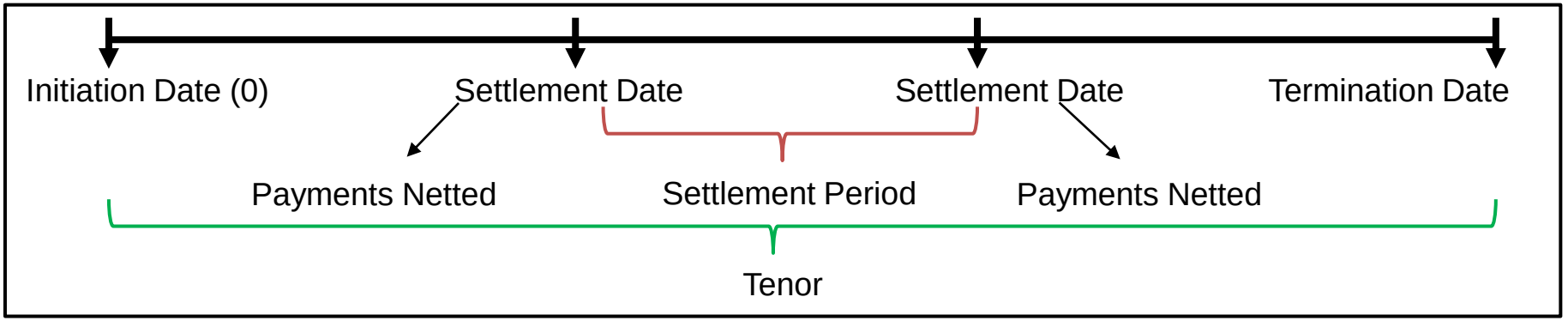
Swap Markets and Contracts

1) Introduction
2) Interest Rate Swaps
3) Other types of Swaps

Introduction
Key Features

- Definition: A swap is an agreement between two parties to **exchange a series of future cash flows**.

- **Key Features:**
  1. **OTC:** therefore it is **Custom, Unregulated** and **Subject to Default Risk**
  2. **Zero value at initiation:** When a swap is initiated, neither party pays any amount to the other. Therefore, a swap has zero value at the start of the contract.
  3. **Key terminology:**



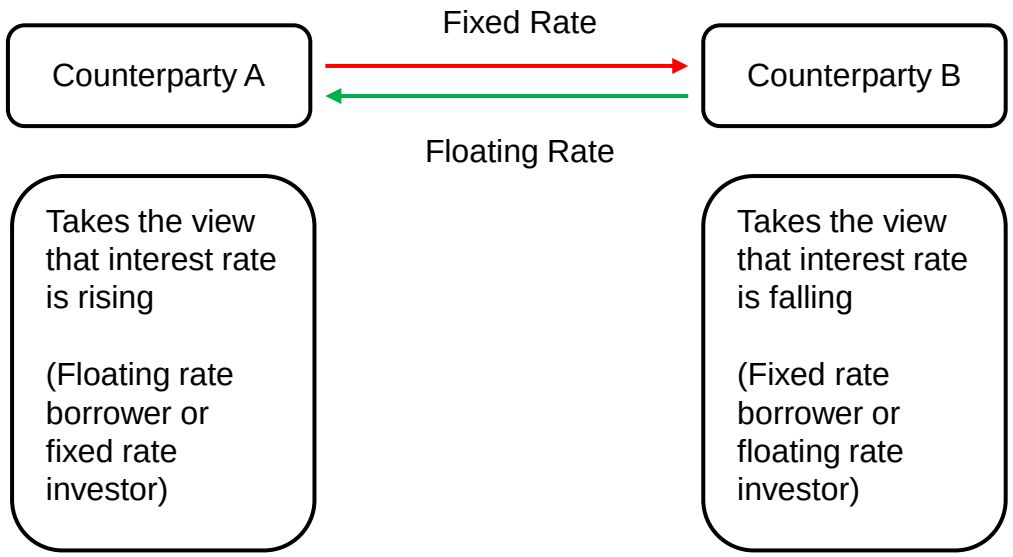
- Termination of a Swap:
  1. **Resale:** sell swap to another party with permission of counterparty to the swap.
  2. **Offsetting contract:** May involve taking a loss, will expose investor to default risk
  3. **Swaption:** Option to enter into a swap
  4. **Mutual Termination:** Cash payment made by one party that is acceptable to another

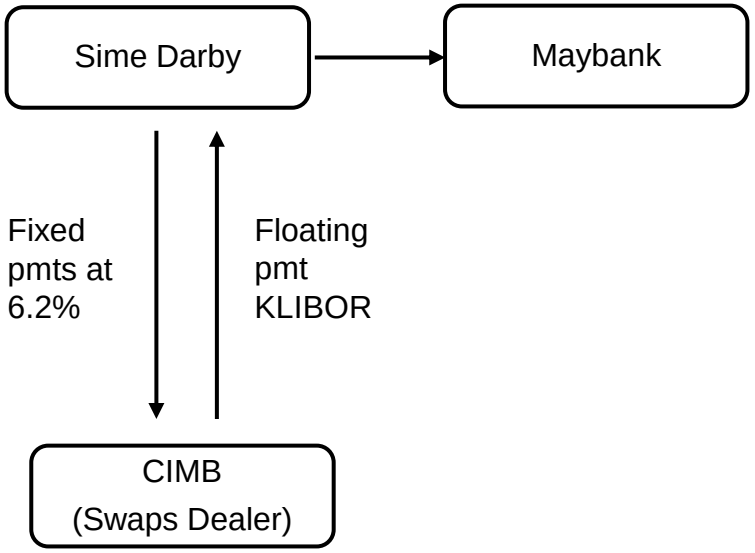
Interest Rate Swap: Hedging Interest Rate Risk

A swap is basically a series of forward contracts

- A plain vanilla swap is simply an interest rate swap in which one party pays a fixed rate and the other pays a floating rate, with both sets of payments in the same currency.

- Note that since the **same currency** is used, there is **no need to exchange notional principals** at the beginning and at the end of an interest rate swap. Thus interest payments can be, and nearly always are, **netted**.

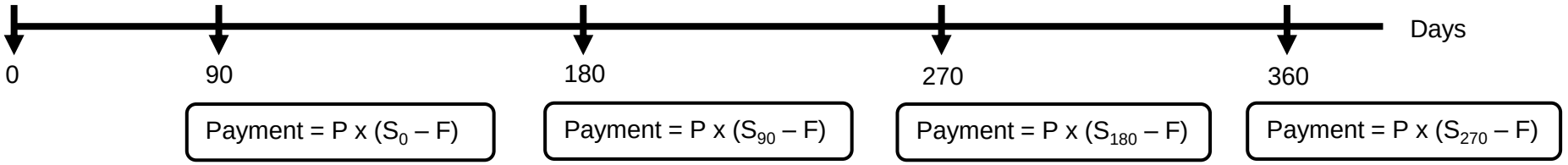




Interest Rate Swap: Hedging Interest Rate Risk

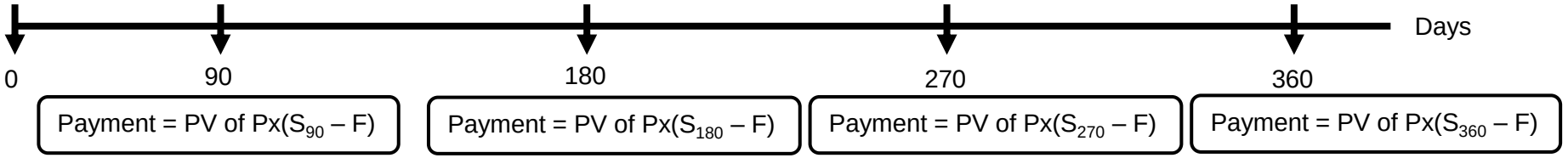
Illustration

1 year Swap with quarterly payment
Notional amount = P
Fixed leg rate = F
Floating leg rate = 90-day KLIBOR ("S")



Series of *off-market FRAs* based on 90-day KLIBOR
Notional amount = P
FRA rate = Swap Rate = F

- 3x6 FRA
- 6x9 FRA
- 9x12 FRA
- 12x15 FRA



The next payment of a swap is known one period ahead but not for FRA as its payment is made at expiration based on the 1-period rate for the next period

→ The cash flow amount of the swap will not be the same as series of FRAs

Other Types of Swaps
Currency Swaps

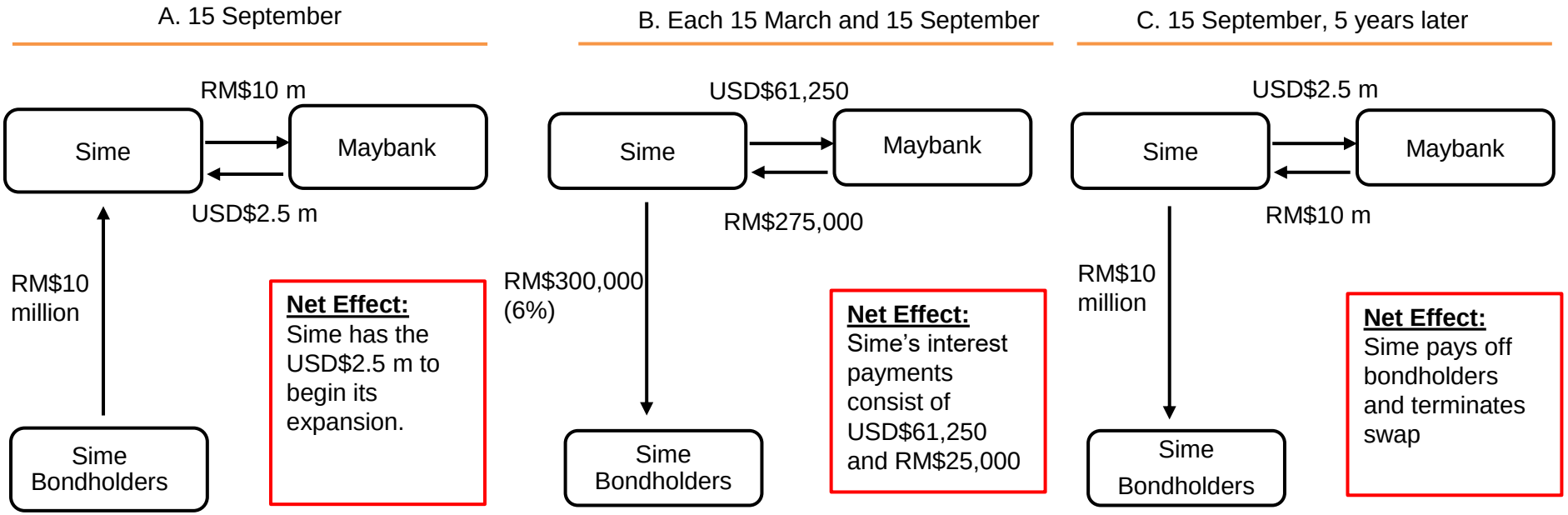
- In a currency swap, each party makes interest payments to the other in different currencies.

- Possible situations: A currency swap can have:
  1. one party pay a fixed rate in one currency and the other pay a fixed rate in the other currency;
  2. have both pay a floating rate in their respective currencies;
  3. have the first party pay a fixed rate in one currency and the second parts pay a floating rate in the other currency; or
  4. have the first party pay a floating rate in one currency and the second pay a fixed rate in the other currency.

- The notional principal is **usually exchanged** at the **beginning** and at the **end** of the life of the swap, although this exchange is not mandatory.

Other Types of Swaps
Currency Swaps

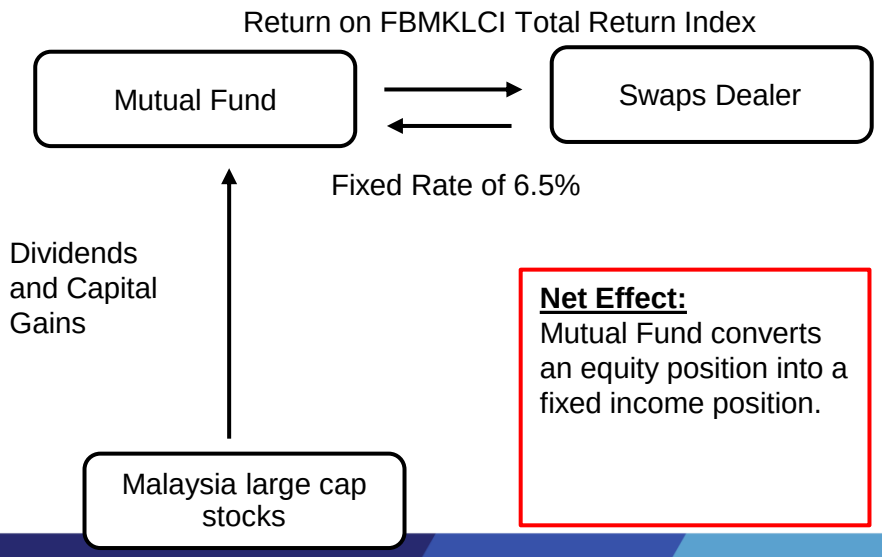
- Example:
  - Sime issues a 5-year RM$10 million bond at a rate of 6%. It then enters a swap with Maybank in which each 15th March and 15th September for 5 years:-
    - Maybank will make payments to Sime in RM at a fixed rate of 5.5%
    - Sime will make payments to Maybank in USD at a fixed rate of 4.9%. The payments are based on a notional amount of RM$10 million and USD2.5 million
- Payments are based on 30 days a month and 360 days a year.



Other Types of Swaps
Equity Swaps

- In an equity swap, the rate is the return on a stock or stock index (instead of interest rate).
- The equity payment (or payments, if both sides of the swap are related to an equity return) on an equity swap is calculated by multiplying the return on the stock over the settlement period by the notional principal.
- If there is a fixed or floating payment. it is calculated in the same manner as in an interest rate.
- Eg:
  - On the last day of December, a mutual fund would like to sell RM$100 million in Malaysian large-cap equities and invest the proceeds at a fixed rate. It enters into a swap allowing it to pay the total return on the FBMKLCI, while receiving a fixed rate. It would like to hold this position for one year, with payments to be made on the last day of March, June, September, and December.

Converting an Equity Position into a Fixed Income Position: During the Life of Swap

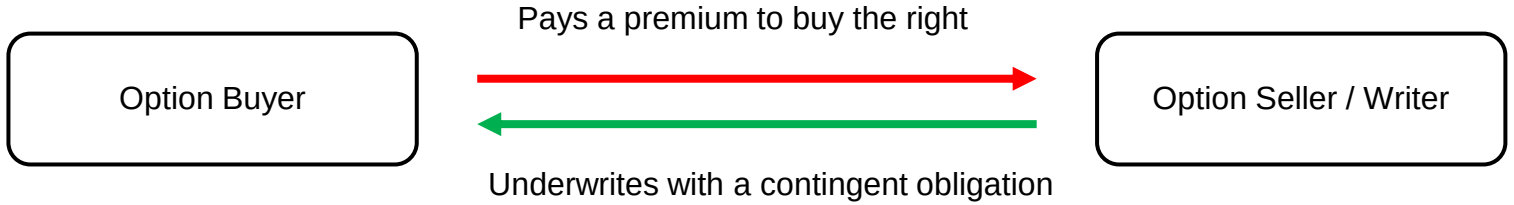


Option Markets and Contracts

1) Introduction
2) Basic Definitions and Illustrations of Options Contracts
3) Principles of Option Pricing

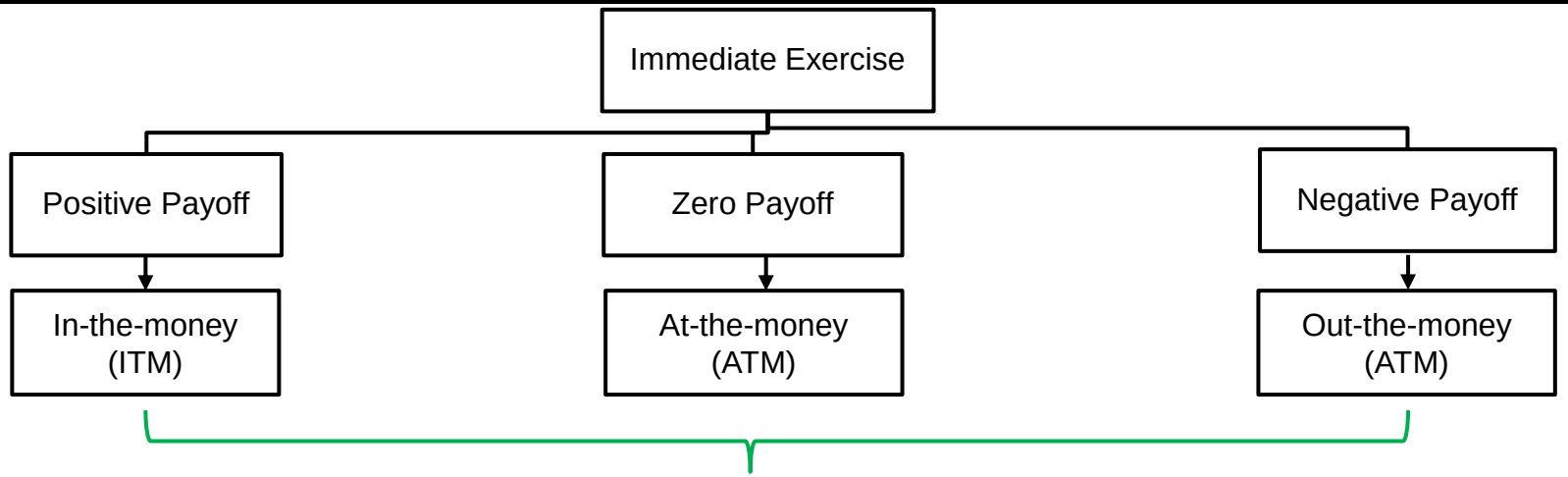
Introduction
Key Features

- Definition: An option is a contract between 2 parties in which 1 party (buyer) has the **right, but not the obligation**, to buy or sell a specified asset at a specified price, at or before a specified date, from the other party (seller).
- Call option has the **right to purchase** the underlying asset
- Put option has the **right to sell** the underlying asset
- **Features of an option:**
  1. **TYPE OF OPTION –** call or put
  2. **UNDERLYING ASSET ("S_0") –** the instrument on which the option is based
  3. **STRIKE PRICE ("X")** – the price that the option is exercised
  4. **EXERCISE RIGHTS –**
     - **American options** may be exercised at any time up to and including the contract's expiration date.
     - **European options** can be exercised only on the contract's expiration date. **FBMKLCI options are European.**
  5. **PREMIUM –** the purchase consideration of the option.



Key Feature

Moneyness of an option refers to whether an option is in-the-money or out-of-the-money



Moneyness	Call Option	Put Option
In-the-money	S > X	S < X
At-the-money	S = X	S = X
Out-the	S < X	S > X

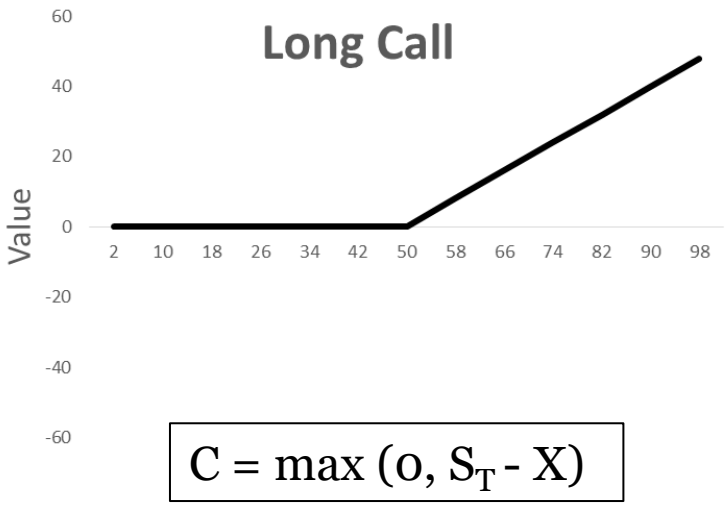
Option Value

$$\text{Option Value} = \text{Time Value} + \text{Intrinsic Value}$$

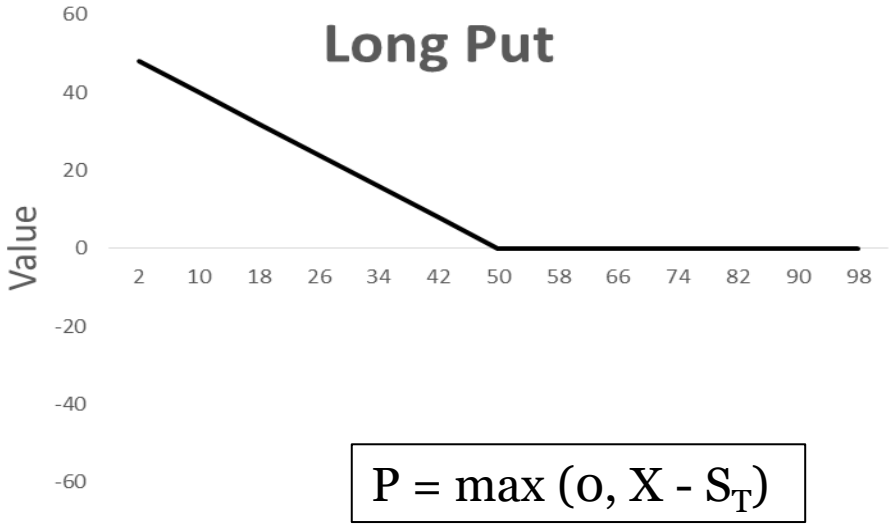
It reflects the uncertainty of what will happen in the future to the price of the underlying

The intrinsic value of a call = max [S- X,0]
The intrinsic value of a put = max [X-S,0]

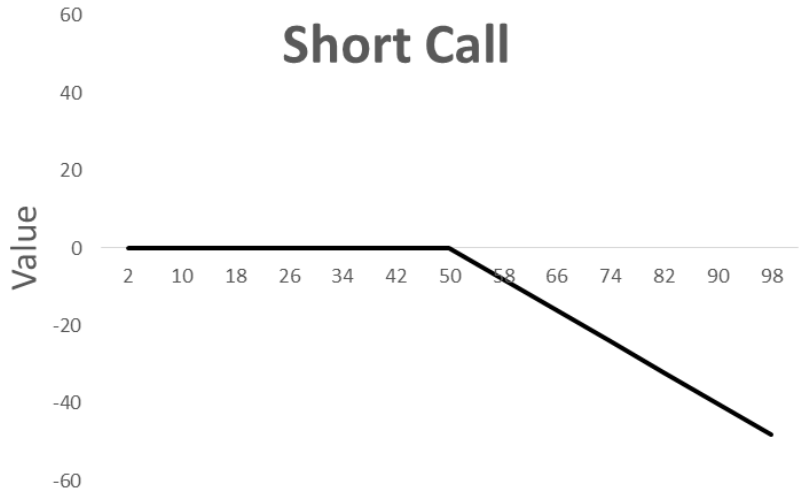
Option Values at Expiration (Payoffs)

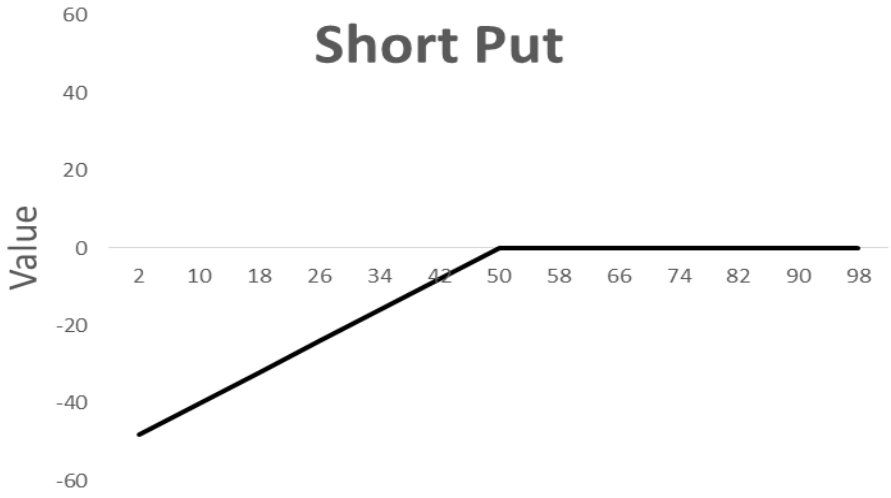


$C = \max(0, S_T - X)$



$P = \max(0, X - S_T)$





Option Values Prior to Expiration (Payoffs)

Option Value Limit

- **Lower Bound** = Minimum value of an option at time t:
  - No intrinsic value can be below zero -> lower bound for both European and American option = 0
- **Upper Bound** = Maximum value of an option at time t
  - No one will pay more than the asset's current price for a right to buy that asset in the future -> upper bound for both European and American call option = S_T
  - Maximum Value of a put option occurs when the underlying asset price goes to zero -> upper bound for **American put** = X; **European put** = Present value of X

Option	Min value at time = t	Max value at time = t
American Call	$C \geq 0$	$C \leq S$
European Call	$c \geq 0$	$c \leq S$
American put	$P \geq 0$	$P \leq X$
European put	$p \geq 0$	$p \leq \frac{X}{(1+Rf)^{(T-t)}}$

Option Values Prior to Expiration (Payoffs)

Option pricing – Upper and Lower bound

	Call		Put	
	European	**American**	**European**	**American**
Upper Bound	$c_o \leq S_o$	$C_o \leq S_o$	$p_o \leq \frac{X}{(1+Rf)^{(T-t)}}$	$P_o \leq X$
Lower Bound	$c_o \geq \text{Max}[o, S_o - \frac{X}{(1+Rf)^{(T-t)}}]$	$C \geq \text{Max}[o, S_o - \frac{X}{(1+Rf)^{(T-t)}}]$	$p \geq \text{Max}[o, \frac{X}{(1+Rf)^{(T-t)}} - S_o]$	$P \geq \text{Max}[o, X - S_o]$

** **American Option** should be **worth at least as much** as an **equivalent European option**, due to its early exercise option

For a **non-dividend** paying stock, there is no advantage to exercise early a call option

Early Exercise on a deep-in-the-money put option may be viable as its payoff from an immediate exercise will be higher than exercise at maturity

Factors affecting option prices

	Call	Put
Underlying Asset Value (S_0)	+	-
Exercise Price (X)	-	+
Time to Expiry (T)	+	+
Interest Rate (R_f)	+	-
Volatility	+	+
Dividends (q)	-	+

A longer-term European or American call must be worth at least as much as a corresponding shorter-term European or American call.

A longer-term American put must be worth at least as much as a shorter-term American put.

A longer-term European put, however, can be worth more or less than a shorter-term European put.

American option prices must always be no less than those of otherwise equivalent European options.

American call options, however, are never exercised early unless there is a cash flow on the underlying, so they can sell for the same as their European counterparts in the absence of such a cash flow.

American put options nearly always have a possibility of early exercise, so they ordinarily sell for more than their European counterparts.

Key Concept
Put-Call Parity

$$c_0 + \frac{X}{(1+r)^T} = p_0 + S_0$$

It is a relationship that ensures parity and consistency between European calls and puts with similar characteristics. It describes the payoffs of 2 portfolio combinations:

Fiduciary call

		Value at Expiration	
Fiduciary Call	**Current Value**	**$S_T \leq X$**	**$S_T > X$**
Buy Call	c_0	0	$S_T - X$
Buy Bond	$\frac{X}{(1+r)^T}$	X	X
Total	$c_0 + \frac{X}{(1+r)^T}$	X	S_T

Protective Put

		Value at Expiration	
Protective Put	**Current Value**	**$S_T \leq X$**	**$S_T > X$**
Buy Put	p_0	$X - S_T$	0
Buy Underlying Asset	S_0	S_T	S_T
Total	$p_0 + S_0$	X	S_T

Both portfolios yield the same payoff at maturity. This relationship is called **put-call parity.** According to rule of no arbitrage, both portfolios should be the same price.

Key Concept
Put-Call Parity

- **A fiduciary call, consisting of a European call and a zero-coupon bond, produces the same payoff as a protective put, consisting of the underlying and a European put.** Therefore, their current values must be the same.

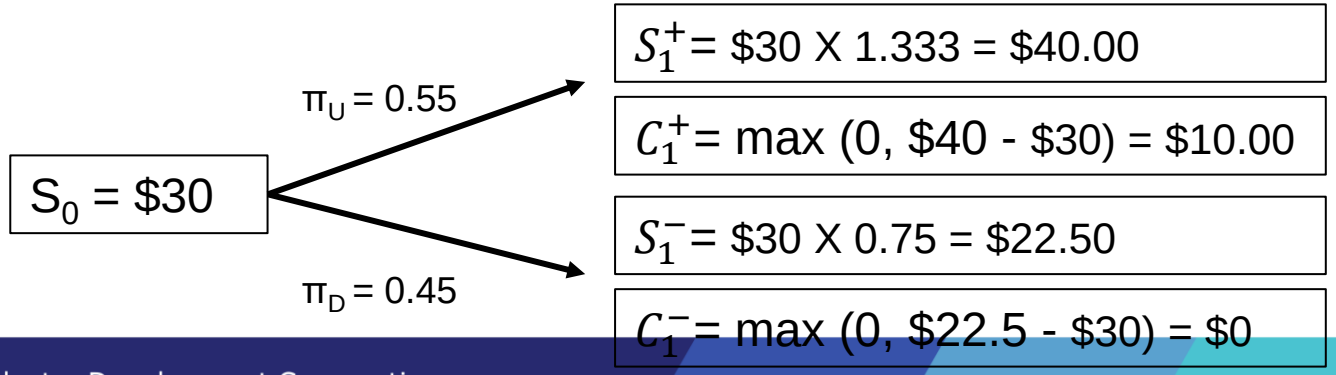
- For this equivalence to occur, **the call price plus bond price must equal the underlying price plus put price**. This relationship is called **put-call parity** and can be used to identify combinations of instruments that synthesize another instrument by rearranging the equation to isolate the instrument you are trying to create.

- Long positions are indicated by positive signs. and short positions are indicated by negative signs. One can create a synthetic call a synthetic put, a synthetic underlying, and a synthetic bond, as well as synthetic short positions in these instruments for the purpose of exploiting mispricing in the instruments.

- Put-call parity violations exist when one side of the equation does not equal the other. An arbitrageur buys the lower-priced side and sells the higher-priced side, thereby earning the difference in price, and the positions offset at expiration. The combined actions of many arbitrageurs performing this set of transactions would increase the demand and price for the underpriced instruments and decrease the demand and price for the overpriced instruments, until the put—call parity relationship is upheld.

One Period Binomial Pricing Model

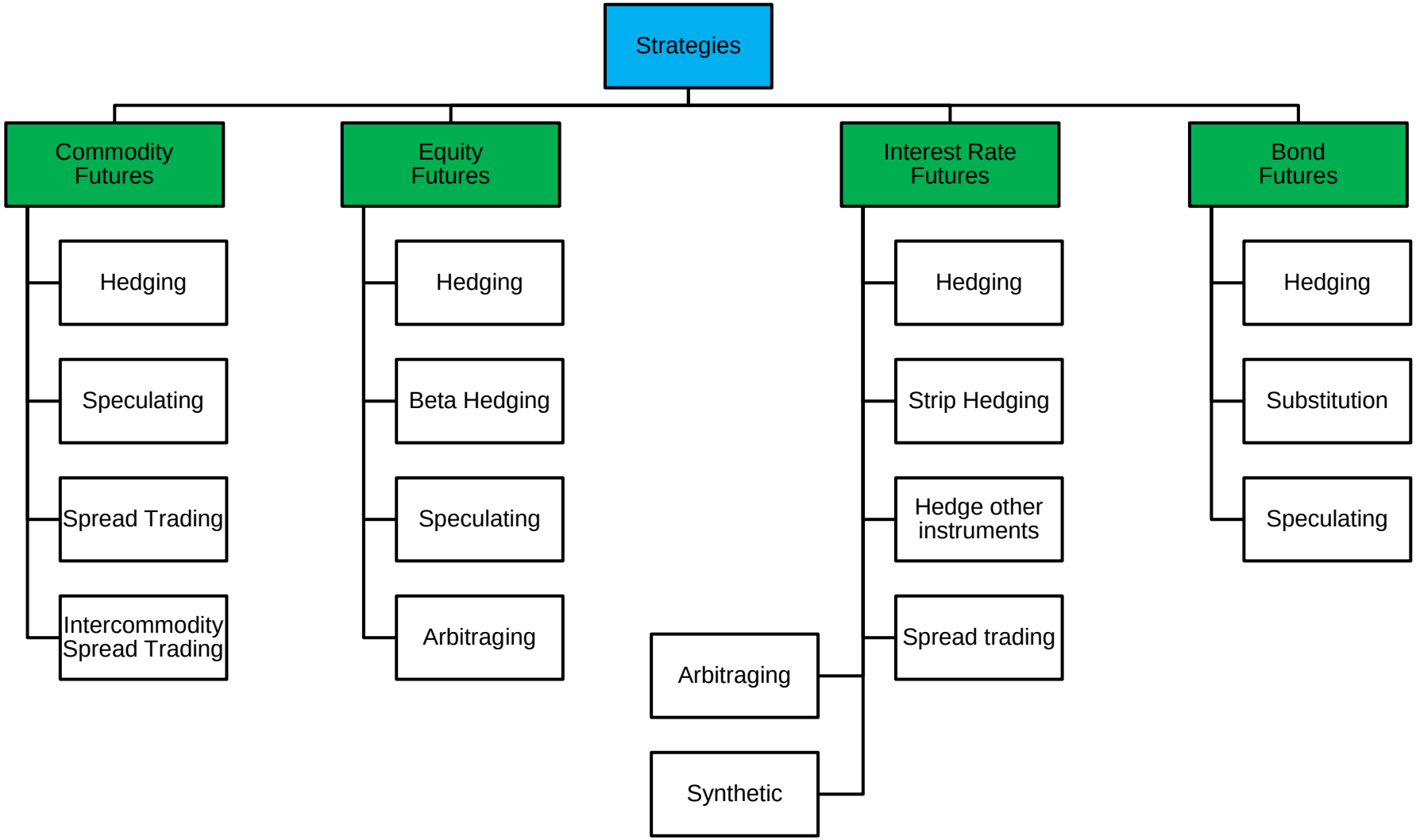
- Binomial Pricing Model is based on **backward induction methodology.**
- Input Required:
  - Beginning underlying asset value
  - Size of up and down (U and D) -> 1/U
  - Possibilities of up and down -> P(U) and P(D) -> P(D) = 1 –P(U)
    - π_U = risk neutral probability of an up-move = $\frac{1+Rf-D}{U-D}$
  - We can calculate the value of an option on the stock by:
    - Calculating the payoff of the option at maturity in both the up-move and down-move states.
    - Calculating the expected value of the option in 1 year as the probability weighted average of the payoffs in each state.
    - Discounting this expected value back to today at the risk free rate.



Part 2 Strategies

1) Introduction
2) Basic Definitions and Illustrations of Options Contracts
3) Principles of Option Pricing

Futures Strategies



Commodity Futures

1) Hedging – Anticipatory hedge

- Sime Darby, a CPO refiner, wants to receive an order for a large volume of refined palm oil for which they will need 1,000 tons of crude palm oil. The order is to be filled by August.
- The palm oil futures for delivery in August are trading at RM1,274. The current cash price is RM1,270, which is lower than the futures price. However, the refiner does not have the cash to purchase the CPO now. Fearing the crude palm oil spot price will increase more than RM1,274 in August, the refiner **wants to use futures** to lock in the buying price of RM1,274.
- The **contract size** of the CPO futures contract is **25 metric tons**.

a) How many CPO futures contract does he buy to hedge against a potential price increase?

Commodity Futures
2) Speculating

- Julian expects that the price of crude palm oil is about to experience an uptrend. It is now June and he buys 10 August crude palm oil futures at a price of RM1,170. Julian pays an initial margin of RM15,000.As per his expectations, the market moved up slightly on the day of purchase to close at RM1,172.
  a) What is his **valuation gain**?

- On day 2, the market reverses and closes at RM1,165.
  b) What is the **variation margin** paid by Julian?

- On day 3, the market rises sharply to close at RM1,215.
  c) What is the **variation gain** recorded by Julian?

- Julian leaves the position open in anticipation of further increases in the futures market. On the **Day 4**, the market rises again to close at RM1,227. He senses a slowdown in the market and decides to close his position by selling 10 crude palm oil futures at RM1,227 realising a further gain of 12 ticks (a gain of RM3,000)

  d) What is his **total gain**?

Equity Futures
Overview

- 2 types of Equity futures:
  1. **FTSE Bursa Malaysia KLCI Futures (FKLI)**
     - An agreement between buyer and seller to respectively deliver and take delivery of the **basket of shares** that make up the index
     - Cash settled
     - **Index futures have a multiplier. The actual futures price =quoted futures price (in points) × the multiplier.**
       - For S&P 500 Index futures, the multiplier is $250; for FTSE 100 Index futures, the multiplier is £10. **For FBMKLCI, multiplier is RM50**

  2. **Single Stock Futures (SSF)**
     - An agreement between buyer and seller to respectively deliver and take delivery of a selected underlying **single share**
     - Investors can take position in a share without actually owning the shares but still enjoy the same capital gain
     - However, because they are not actual shareholders, they don't receive dividends or any of the share rights such as voting in shareholder meetings.
     - **Contract size = 1,000 shares**

Equity Futures

Stock Market vs Futures Market

Areas of Difference	Stock Market	Futures Market
Length of exposure	Bought and held indefinitely	Specified expiry date
Leverage	-	Leveraged due to margin structure
Short selling	Very restrictive conditions	Much easier to execute
Structure	-	Standardised contracts

Equity Futures

1) Using index futures to hedge equity market exposure

- A fund manager holds a £200 million equity portfolio, which is passively tracking the FTSE 100 Index. The fund manager wishes to hedge 30% of the portfolio against equity market risk.

Contract Details for FTSE 100 Index Futures	
Quotation	Index points
Multiplier	£10 per point
Tick size	0.5 points
Delivery dates	March, June, September, December
Settlement price	FTSE 100 cash price on last day of trading
Futures price – September delivery	7,300

a) Compute the number of contracts required to hedge 30% of the portfolio's equity position.

b) Compute the profit or loss if the FTSE 100 increases by 5% and the futures price is 7,665.

c) Compute the profit or loss if the FTSE 100 falls by 5% and the futures price changes to 6,935.

Equity Futures

2) Achieving a Target Portfolio Beta

- **Achieving a Target Portfolio Beta -** Short equity futures positions can be used to decrease the beta of a portfolio, and long positions can be used to increase the beta of a portfolio.

- A portfolio's beta is the weighted average of the betas of the portfolio stocks. The number of contracts required to change the beta of an existing portfolio can be calculated with the following formula:

$$\text{number of futures required} = \left(\frac{\beta_T - \beta_P}{\beta_F}\right)\left(\frac{MV_P}{F}\right)$$

where:

β_T = target portfolio beta

β_P = current portfolio beta

β_F = futures beta (beta of stock index)

MV_P = market value of portfolio

F = futures contract value = futures price × multiplier

Note that to fully hedge the portfolio from market risk, $\beta_T = 0$.

Equity Futures

2) Achieving a Target Portfolio Beta

Example - Achieving a Target Portfolio Beta

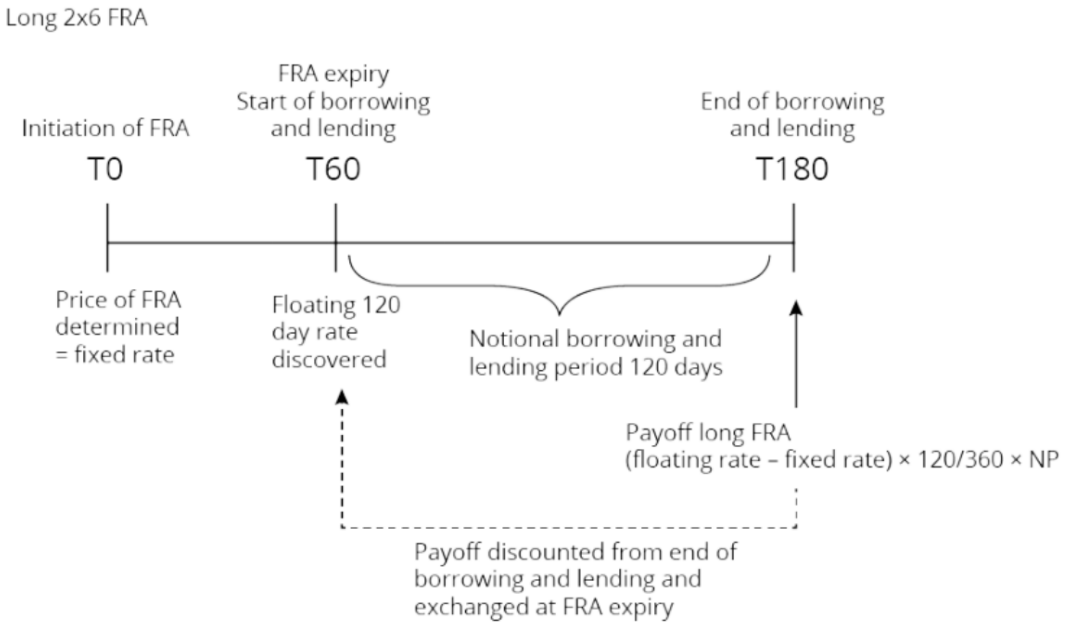
- A fund manager has a RM60 million portfolio of aggressive stocks with a portfolio beta of 1.2 relative to the FBMKLCI. The fund manager believes the market will decline over the next six months and wishes to reduce the beta of the portfolio to 0.8 using FBMKLCI futures. FBMKLCI futures currently have a contract price of 2,984 and a multiplier of RM50. At the end of the six-month period, the FBMKLCI Index has decreased by 1.5%. By definition, beta of the FBMKLCI Index equals 1.

a) Calculate the number of futures contracts and determine whether they should be bought or sold to achieve the target portfolio beta.

b) Compute the effectiveness of the strategy at the end of the six-month period.

Managing Interest Rate Risk
FRA (Forward Rate Agreement)

- FRAs are typically used to hedge the uncertainty about a future short-term borrowing or lending rate.

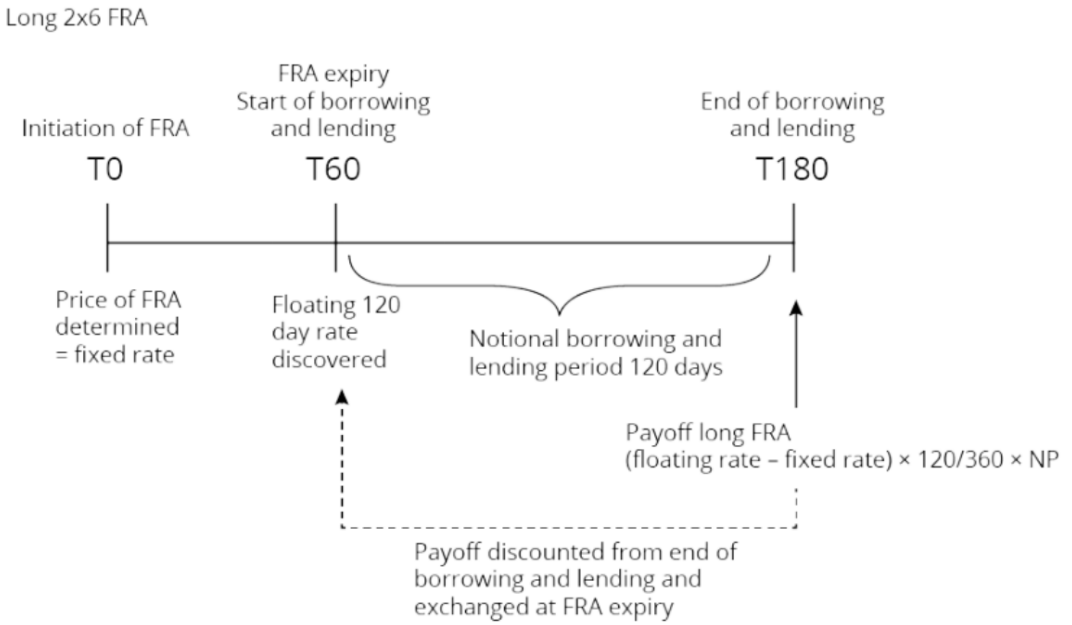


This illustrates an FRA based on the future 120-day borrowing rate that settles 60 days from initiation.

Note that the payment is made at the future borrowing or lending date and is equal to the present value of the difference in interest between a market-rate loan and a loan at the forward rate (rate specified in the FRA).

Managing Interest Rate Risk
FRA (Forward Rate Agreement)

- FRAs are typically used to hedge the uncertainty about a future short-term borrowing or lending rate.



FRA Settlement Payment to Long

$$\frac{\text{Notional principal} \times (\text{Floating} - \text{Forward})\left(\frac{\text{Days}}{360}\right)}{1 + \text{Floating}\left(\frac{\text{Days}}{360}\right)}$$

Days = number of days in floating rate term

Managing Interest Rate Risk

Interest Rate Futures

- Short-term interest rate (STIR) futures conceptually very similar to FRAs. The futures price is forward interest rate on deposits starting at the expiry of the future and lasting for 30 days.

- The standardization of futures means that contracts are only available on specific maturities (typically quarterly). Users that are hedging interest rate risk will often need to enter an offsetting transaction to close their futures position out when the hedge is no longer needed.

- Kuala Lumpur Interbank Offer Rate (KLIBOR) futures (RM-based STIR futures) are based on deposits of RM1 million and are priced using the KL Wholesale Money Market Index convention (i.e., 100 - annualized forward rate). The pricing convention means that futures prices will rise when forward rates fall. The forward interest rate is calculated from current spot KLIBOR rates in the same way the forward price of an FRA is established.

- One basis point change in the forward rate will cause the contract's value to change by $25 ($1 million × 0.0001 × 90 / 360 = $25).

- Using this pricing convention, a long KLIBOR futures position will increase in value as forward rates decrease and decrease in value as forward rates increase. Note that this **differs from a long FRA position**, which increases in value as forward rates increase and decreases in value as forward rates decrease.

KLIBOR Futures

1) Using KLIBOR futures to hedge short-term future investing

Example - Using KLIBOR futures to hedge short-term future investing

- Allan Lim is expecting to receive a RM 20 million inheritance in 120 days. Allan intends to invest the RM 20 million in a 90-day deposit account at KLIBOR –25 BP. Currently, KLIBOR futures expiring in 120 days are trading at 95. Allan is concerned that short-term rates may fall before he makes his deposit and would like to lock in a guaranteed interest rate today. He takes a long position in 20 KLIBOR futures contracts

a) After 120 days, 90-day KLIBOR is quoted at 3.5%. Allan closes out his future position and invests his inheritance in a 90-day deposit account at KLIBOR – 25 BP. What is Allan's RM return from depositing his inheritance combined with his futures position?

b) If 3-month KLIBOR is 6.5% in 120 days, what is Allan's RM return from depositing his inheritance combined with his futures position?

KLIBOR Futures

FRA vs KLIBOR futures

- In many ways, both KLIBOR futures and FRA are similar in the sense that it allows lender and borrower to lock in future lending/borrowing rate.

- The major differences between the 2, besides their pricing conventions, are KLIBOR futures are
  1. Exchange traded,
  2. Standardized
  3. Require a margin deposit that is marked to market,

  while FRAs are customized contracts, created by dealers so that they are not liquid, and subject to counterparty risk.

Fixed Income (Bond) Futures

KLIBOR futures vs Fixed-income (Bond) futures

- Interest rate futures can be used to hedge the interest rate risk of short-maturity bonds (2–3 years), but requires estimation of the sensitivity of the value of each of the bond's cash flows to changes in the corresponding forward rate. Liquidity of interest rate futures decreases for forward rates further in the future.

- **Longer-maturity bonds are most often hedged with fixed-income futures (bond futures)**, which have very good liquidity.

- Treasury futures are available on T-bills, Treasury notes and Treasury bonds and are traded on the CBOT (Chicago Board of Trade) and CME (Chicago Mercantile Exchange). In Europe, government bond futures are traded on the Eurex and ICE exchanges and are available for bonds of various maturities. **In Malaysia, Malaysian Government Securities (MGS) futures are traded on Bursa Malaysia Derivatives.**

Fixed Income (Bond) Futures

1) Using MGS futures to hedge

Example - Using MGS futures to hedge

- Ali holds RM10 million of MGS Bonds. He expects the increase in inflation rates to lead to higher interest rates in the coming months. To avoid risk of falling bond prices, he sells MGS futures.

- The price of the RM10 million bond portfolio is 105 and the September MGS futures is currently 104.50.

a) To fully hedge his portfolio, how many contracts would Ali need?

Fixed Income (Bond) Futures

2) Speculating with MGS futures

Example - Using MGS futures to speculate

- Ahmad, a speculator in MGS futures expects interest rates to rise in the future. The speculator will transact 10 lots of the MGS futures at 115.30.
- The following week, his view that interest rates would rise materializes and the bond futures price falls to 115.

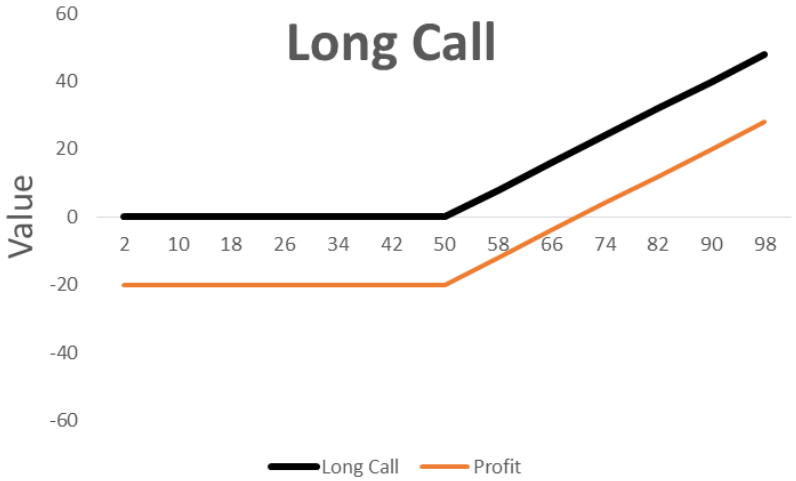
a) Based on his view, should Ahmad buy or sell MGS futures?
b) What is Ahmad's profit?

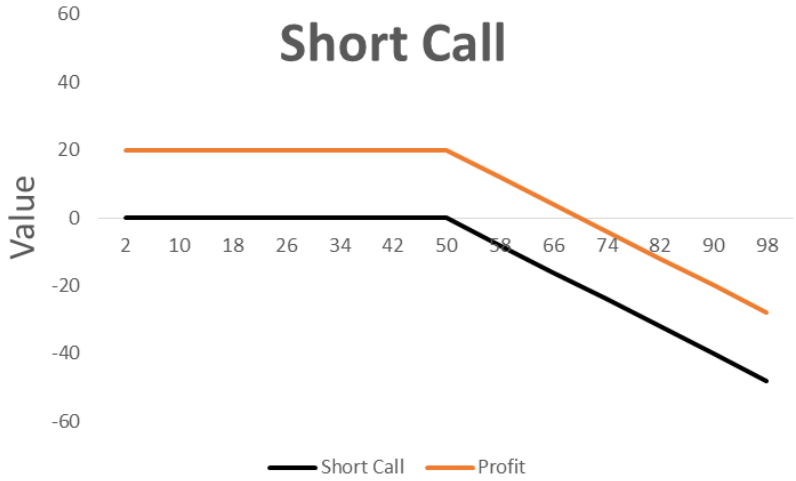
Risk Management Applications of Option Strategies

Options Strategies

Contents and Introduction

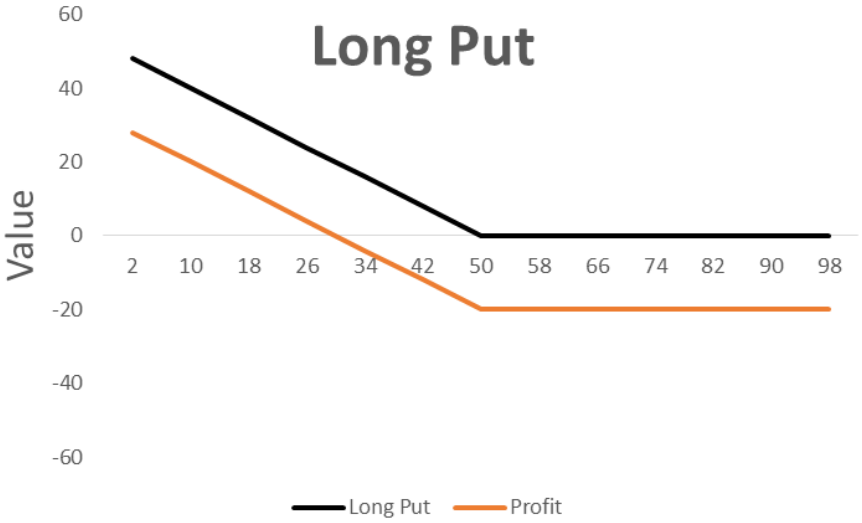
Introduction
Call option

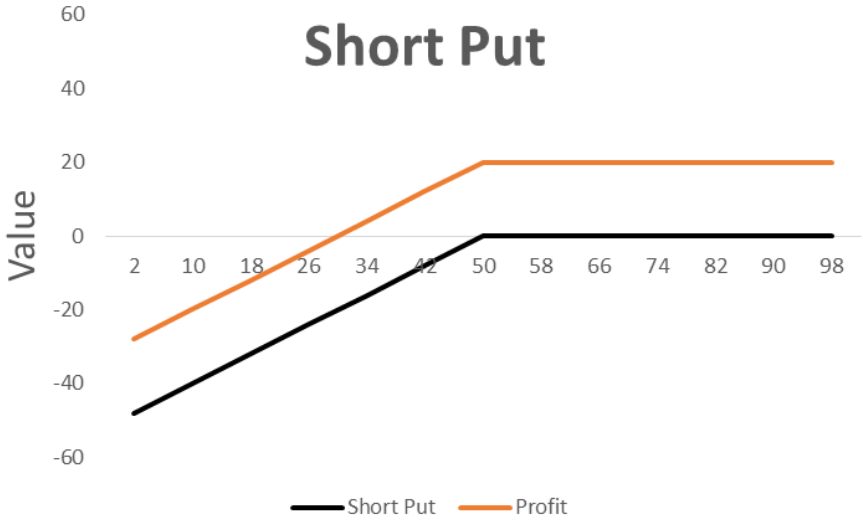




	Long Call	Short Call
c_T	$\max(0,S_T - X)$	$\max(0,S_T - X)$
Value at expiration	c_T	$-c_T$
Profit, Π	$c_T - c_0$	$-c_T + c_0$
Maximum profit	∞	c_0
Maximum loss	c_0	∞
Breakeven, S_T^*	$X + c_0$	$X + c_0$

Introduction
Put option



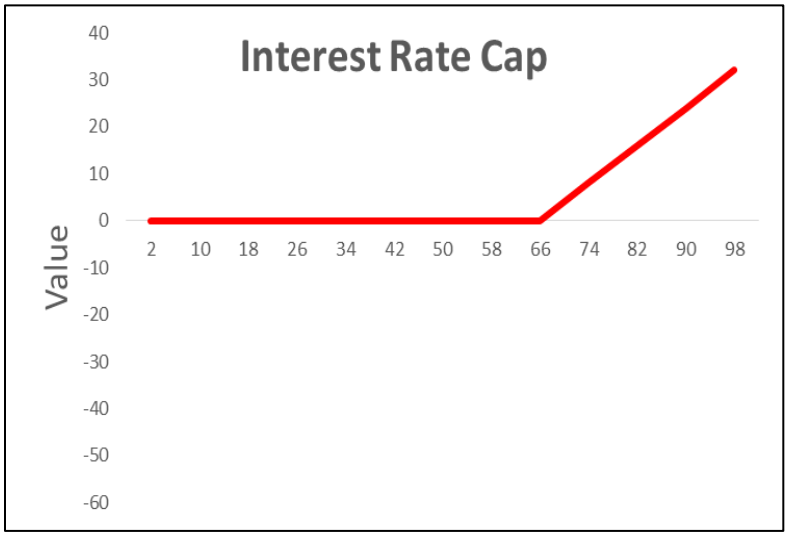


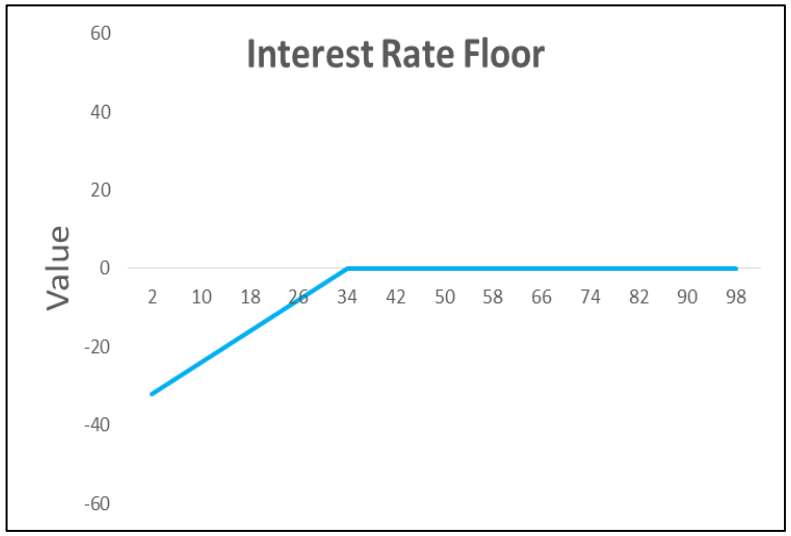
	Long Put	Short Put
p_T	$\max(0, X - S_T)$	$\max(0, X - S_T)$
Value at expiration	p_T	$-p_T$
Profit, Π	$p_T - p_0$	$-p_T + p_0$
Maximum profit	$X - p_0$	p_0
Maximum loss	p_0	$X - p_0$
Breakeven, S_T^*	$X - p_0$	$X - p_0$

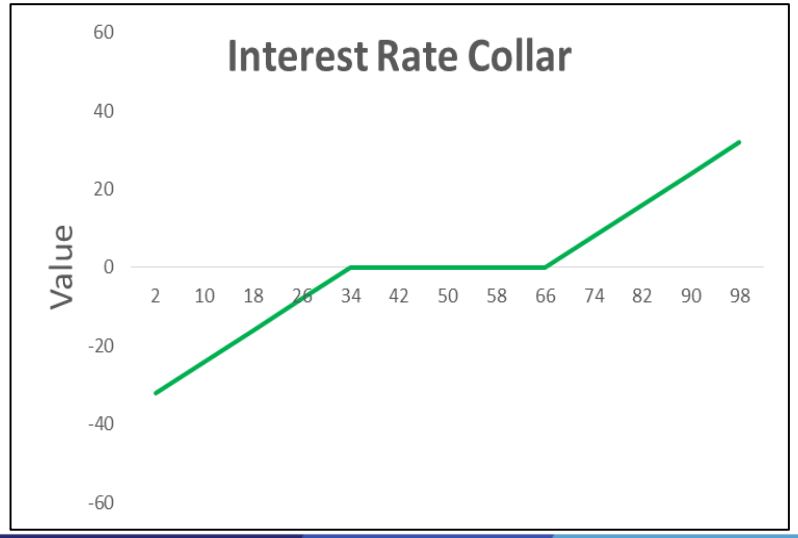
Interest Rate Options

- Interest rate options exist in the form of **caps**, which are call options on interest rates, and floors, which are put options on interest rates.
- **Caps consist of a series of call options**, **called caplets**, on an underlying rate, with each option expiring at a different time. **Floors consist of a series of put options, called floorlets**, on an underlying rate, with each option expiring at a different time.
- Interest rate options are where the exercise price is an interest rate and the underlying asset is a reference rate such as KLIBOR. Interest rate options are also similar to FRAs because there is no deliverable asset.
- Instead they are **settled in cash**, in an amount that is based on a notional amount and the spread between the strike rate and the reference rate. Most interest rate options are European options.
- The payoffs on interest rate options are different. For example, a call option based on 90-day LIBOR makes a payment based on a stated notional amount and the difference between 90-day LIBOR and the option's strike rate.
- The payment is made, not at option expiration, but at a future date corresponding to the term of the reference rate.

Interest Rate Options







2. Position Equivalencies

1. Synthetic Forward Position

2. Synthetic Put and Call

Position Equivalencies

2.1 Synthetic Forward Position

Synthetic Positions using Options

- **Long Call + Short Put = Synthetic Long Forward**

Assuming on 20th March (i.e. Trade date), Stock on XYZ is trading at $52.14. The market price for Stock XYZ call option with 20th May expiry date (i.e. 61 days outstanding maturity) is trading at $6.26 and put option with the same expiry date is trading at $3.87. Both options have the same strike price of $50. **Show how an investor can construct a synthetic long forward on stock XYZ on 20th May by using the option pricing above**. Risk free rate is 3% p.a.

- Total cost of the Long Call + Short Put = $6.26 - $3.87 = $2.39 (payment)

- Total cost of buying the stock now @ $52.14 and simultaneously borrow the PV of strike price (i.e. $50) at 3.00% risk free rate for period of 61 days = $52.14 - $50/$(1.03)^{61/365}$ = $2.39 (payment).

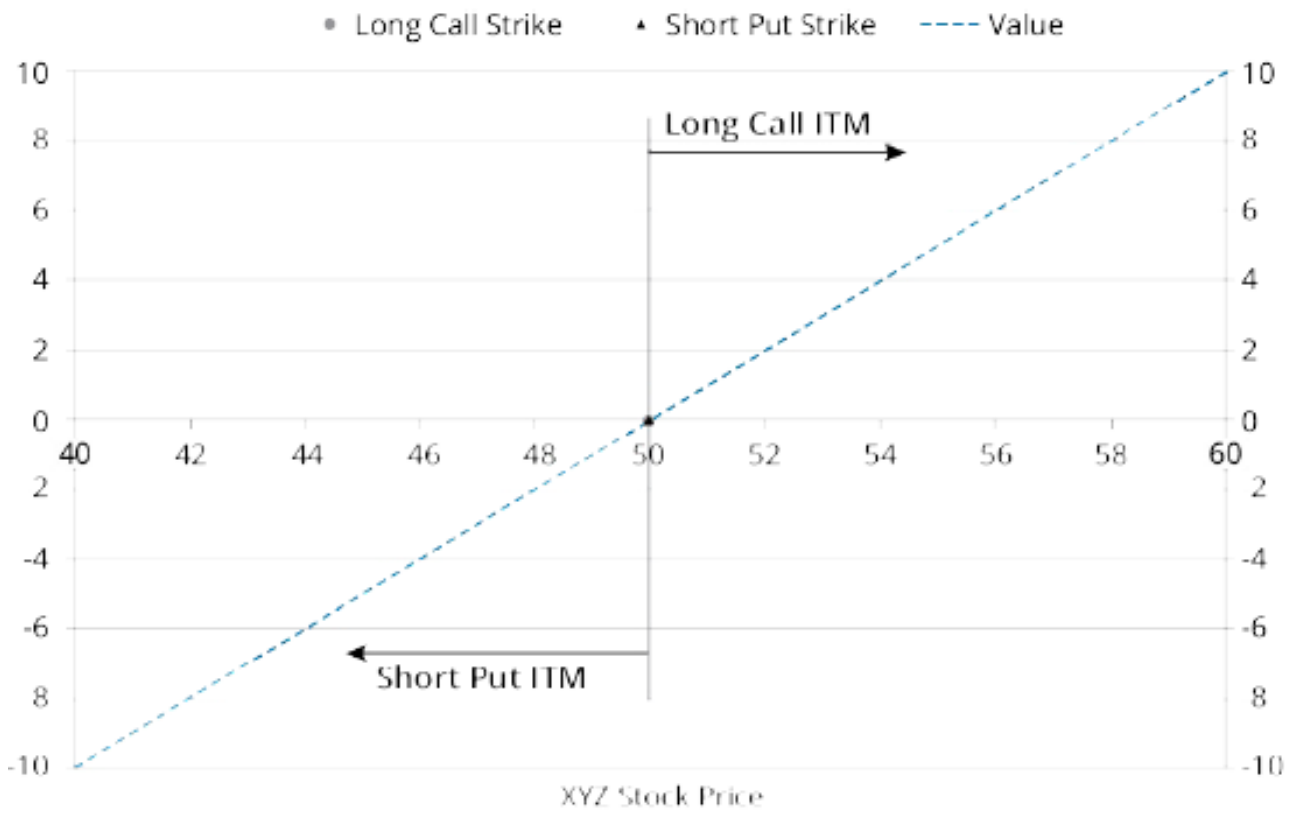
Since both strategy has the same payoff, we can conclude Call premium (paid initially) – put premium (received initially) = initial stock price paid – PV(X) received.

In symbols, **c**0 **– p**0 **= S**0 **– PV(X)**, which can be rearranged to **S**0 **+ p**0 **= c**0 **+ PV(X)**.

Synthetic Positions using Options

Synthetic Positions using Options

- **Long Call + Short Put = Synthetic Long Forward**



Synthetic Positions using Options

Synthetic Positions using Options

- **Long Call + Short Put = Synthetic Long Forward**

Question - Ennis Tan is a dealer who has just sold a four-month forward contract on AlphaCo Stock to a client who will thereby purchase 1,000 shares of the stock for 179.59. AlphaCo's current share price is 179, and AlphaCo will not be paying a dividend during the next four months. The annualized interest rate is 1%, and AlphaCo 179.59 calls and puts are both currently trading at 16.34 per share.

Explain how Ennis could hedge his short forward position using a synthetic long forward position, and explain what happens at expiry if the AlphaCo share price is above or below 179.59.

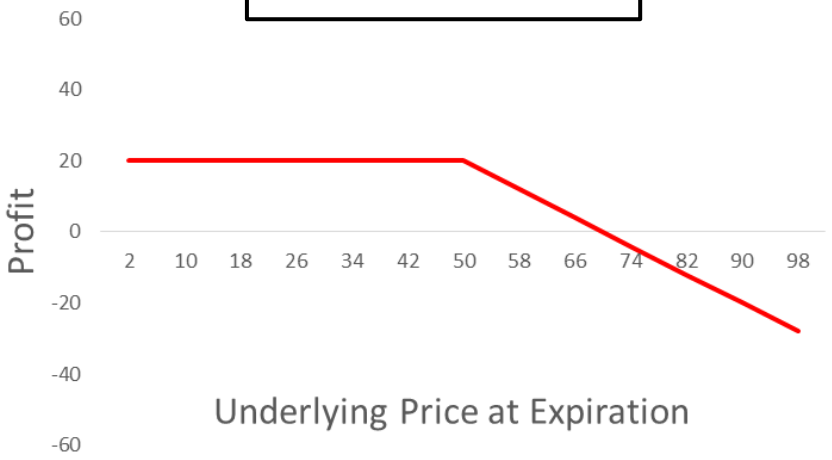
3. Covered Calls and Protective Puts

1. Investment Objectives of Covered Calls
2. Investment Objective of Protective Puts
3. Equivalence to Long Asset/Short Forward Position
4. Writing Puts
5. Risk Reduction Using Covered Calls and Protective Puts

3. Covered Calls and Protective Puts

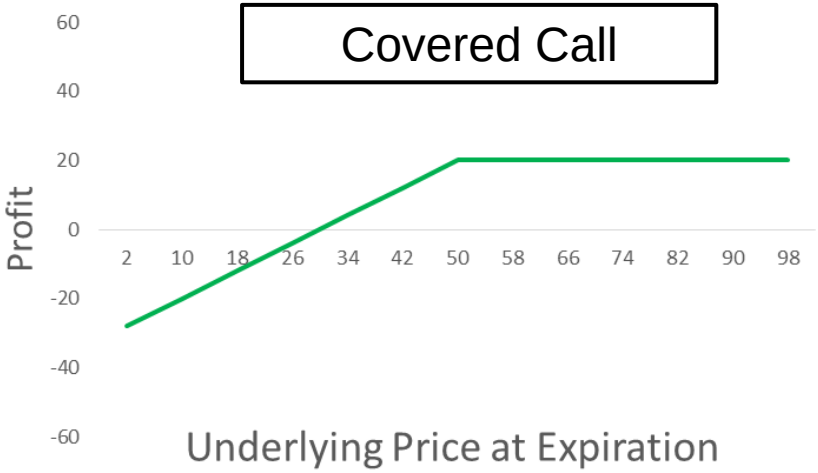
Covered Call Strategy

Short Call



Long Underlying

Covered Call



3. Covered Calls and Protective Puts

Covered Call Strategy - Explanation

- The strategy of covered call is to sell a call option, collect the premium and use the premium to cushion any subsequent price decline of the underlying asset.

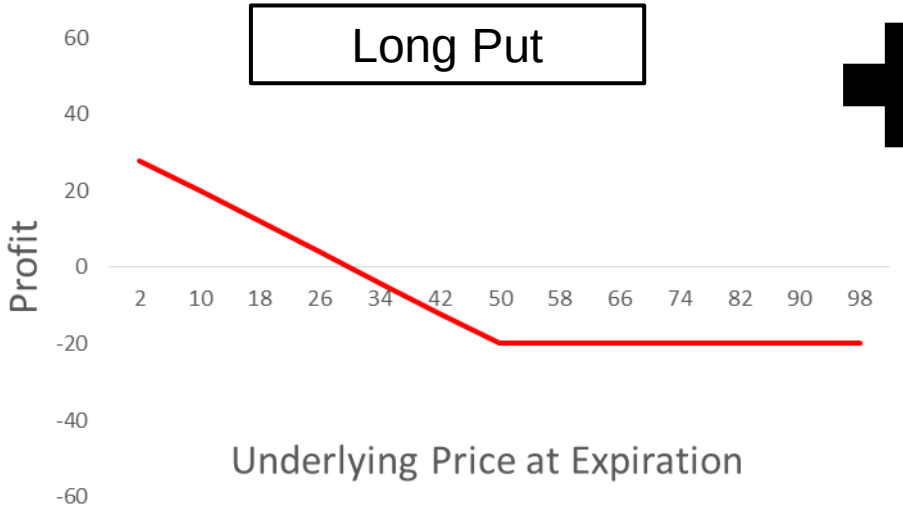
- The premium collected would offset any price decline of the underlying asset, past below the exercise price. Thus, this strategy does not effectively protect against large losses or losses exceeding the value of the premium. The maximum loss is exposed to the price differential between the current underlying asset and the exercise price minus premium paid.**(Maximum loss = [S_0 – X] - c)**.

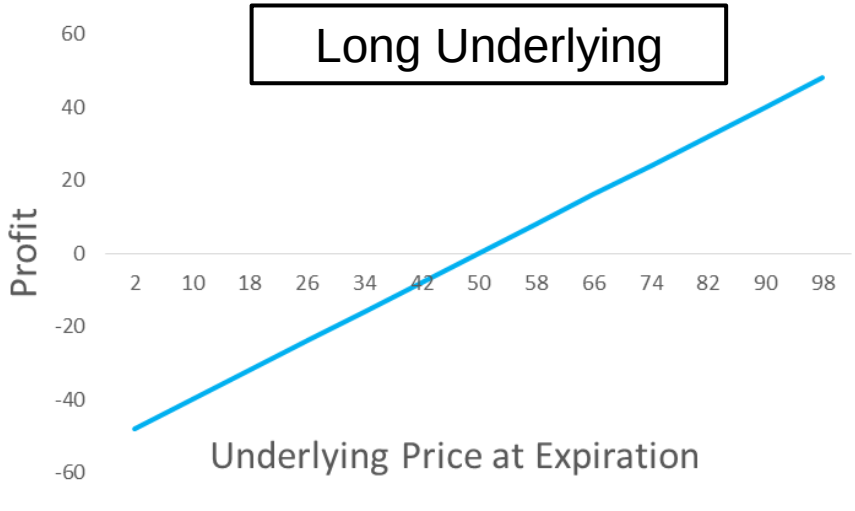
- Should the price of the underlying asset increases, exceeding the exercise price, the call option would be exercised and the writer would deliver the underlying asset. Thus, the maximum gain is capped to the premium plus the price difference between the underlying and the exercise price. **(Maximum gain = c + [X – S_0])**

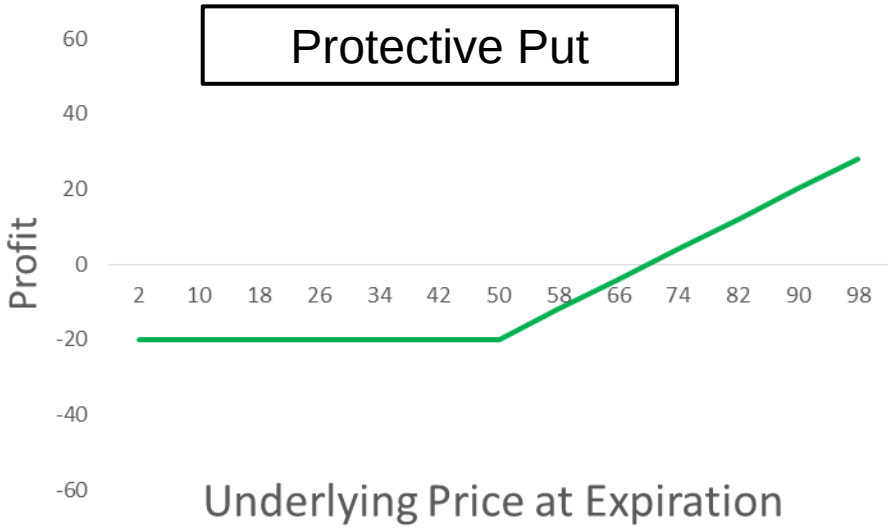
- The breakeven point would be the current underlying price less the premium received. **BEP = S_0 – c**

3. Covered Calls and Protective Puts

Protective Put Strategy/ Portfolio Insurance







3. Covered Calls and Protective Puts
Protective Put Strategy/ Portfolio Insurance - Explanation

- The strategy of protective put is to buy put option on the underlying asset. Should the underlying asset's price decline, and below the exercise price, the put option shall be exercised.

- The gains from an exercised put option would offset any price decline of the underlying asset, past below the exercise price.

- The maximum loss is exposed to the premium paid plus the price differential between the current underlying asset and the exercise price. (**Maximum loss = P + [S_0 – X]**).

- The strategy allows the **maximum gain to remain unlimited**.

- The breakeven point would be the current underlying price plus the premium paid. **BEP = S_0 + p**

4. Spreads and Combinations

1. Collars
2. Straddle/Strangle
3. Bull Spreads and Bear Spreads
4. Butterfly/Condor

4. Spreads and Combinations

4.1 Collar

- The **collar** is probably best thought of as combination of protective put and covered call.

- An investor who is long the underlying could buy a put (most likely OTM) to hedge the stock's downside, while at the same time selling a call (also most likely OTM) to sell off the upside and subsidize the cost of the put.

- Usually the put strike is set, then an appropriate call strike is determined such that the call and put have the same premium. If the options are over-the-counter, rather than exchange-traded, this will be easy to do. In this case there will be no net inflow or outflow at initiation and the investor will have constructed a **zero-cost collar**.

- For example, consider an investor with a holding of XYZ stock on 20 March (price = $52.14). They buy a June 50 put (premium = $4.88) and sell a June 55.87 call (premium = $4.88).

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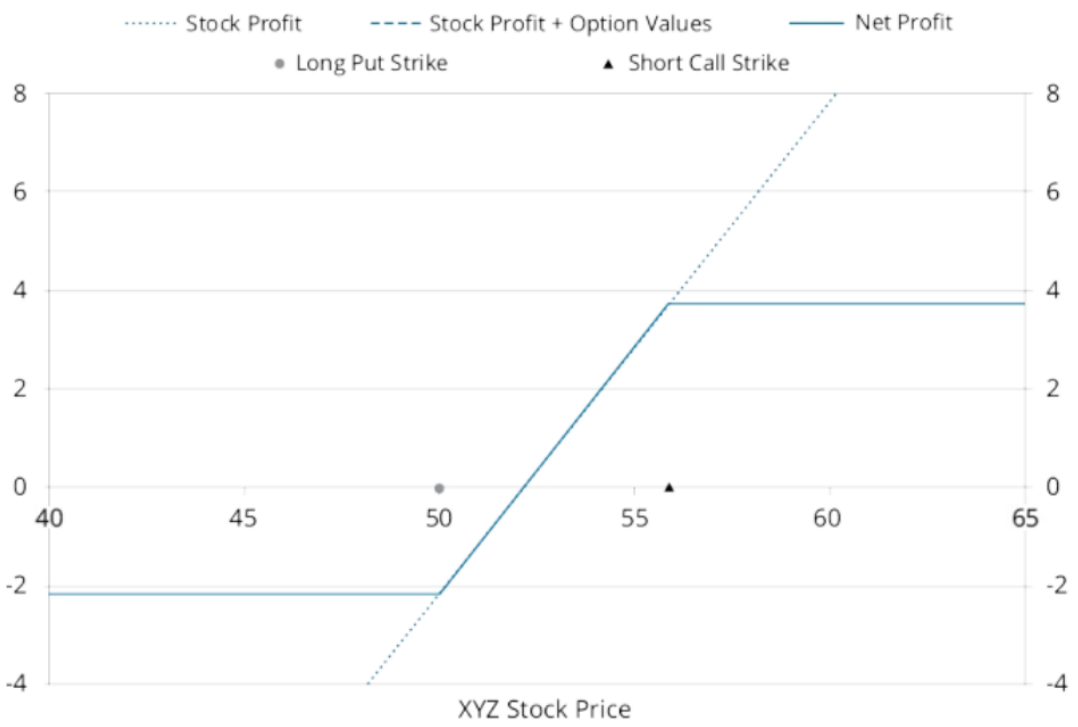
4. Spreads and Combinations

4.1 Collar

At June expiration:-



Notice, in this case, that the line for stock profit + option values is the same as the net profit line because of the zero net initial premium.

The stock value is hedged beyond the strikes, with a maximum profit equal to the rise from the initial stock price up to the call strike ($55.87 – $52.14 = $3.73) and a maximum loss equal to the fall from the initial stock price down to the put strike ($52.14 – $50 = $2.14).

The breakeven stock price is simply the initial stock price of $52.14, as when it was unhedged.

4. Spreads and Combinations

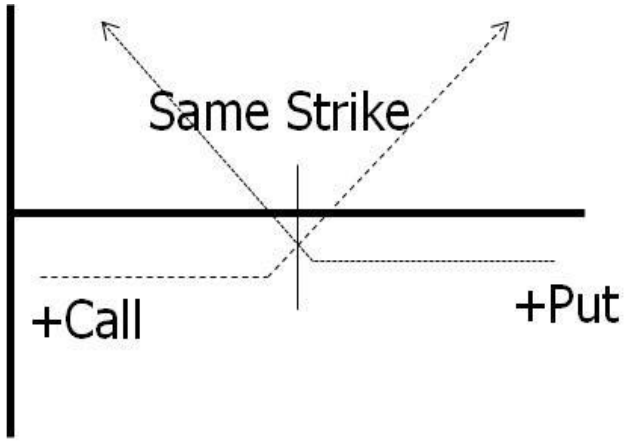
4.2 Straddle / Strangle

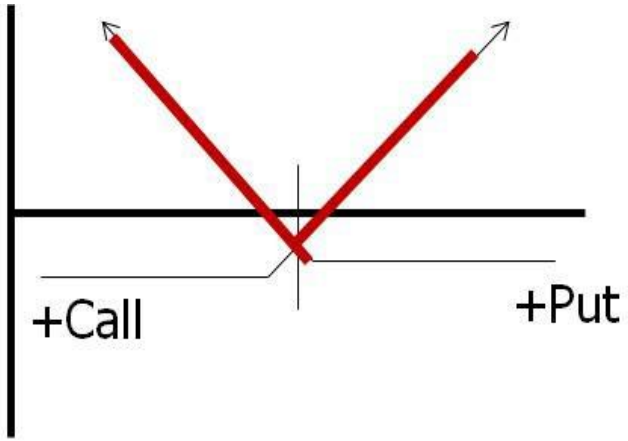
- The **straddle** is the classic volatility play. A **long straddle** involves the purchase of an equal number of calls and puts on a given underlying. The options all have the same expiry date and strike.
- Notice that, unlike the strategies we have considered up to now, the straddle (and the spreads that follow) do not involve a position in the underlying—they just use options.
- Limited risk, but very expensive strategy.
- Significantly affected by implied volatility and time decay.
- Maximum risk is limited; the maximum gain is theoretically unlimited.

4. Spreads and Combinations

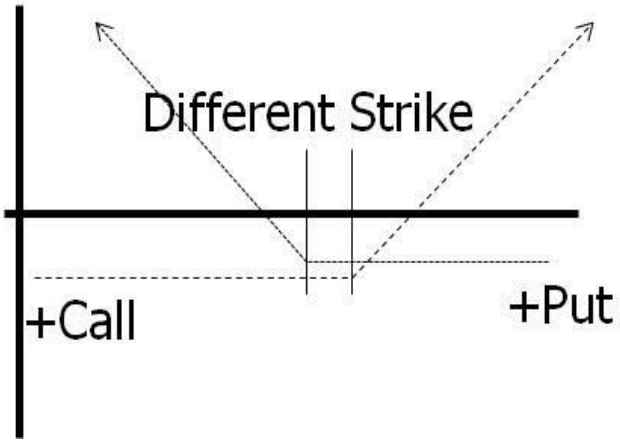
4.2 Straddle / Strangle

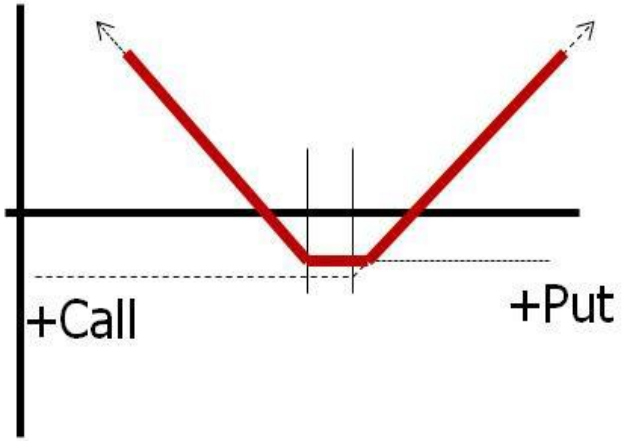
Long Straddle





Long Strangle

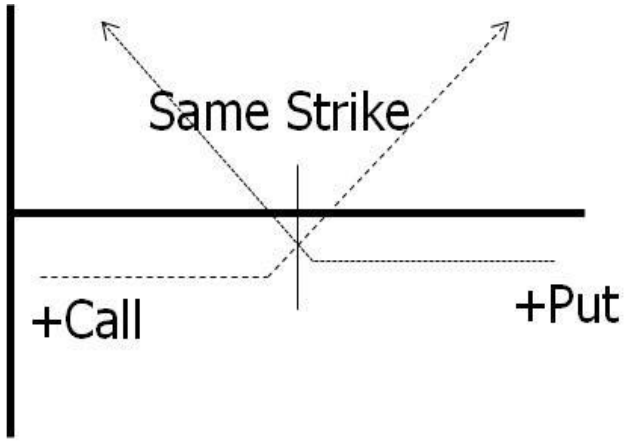


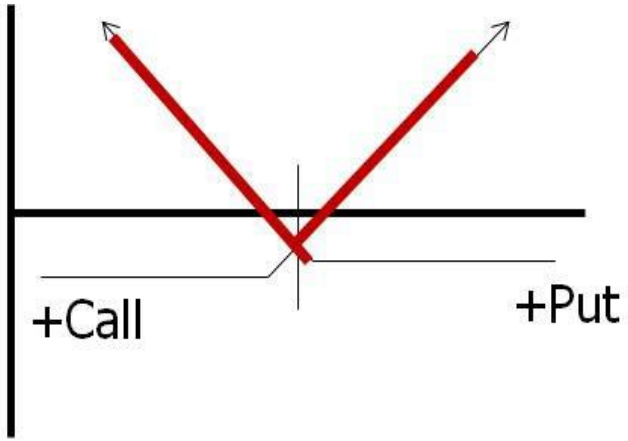


4. Spreads and Combinations

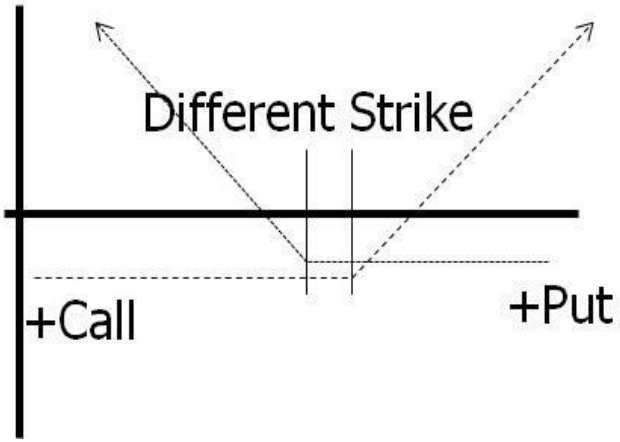
4.2 Straddle / Strangle

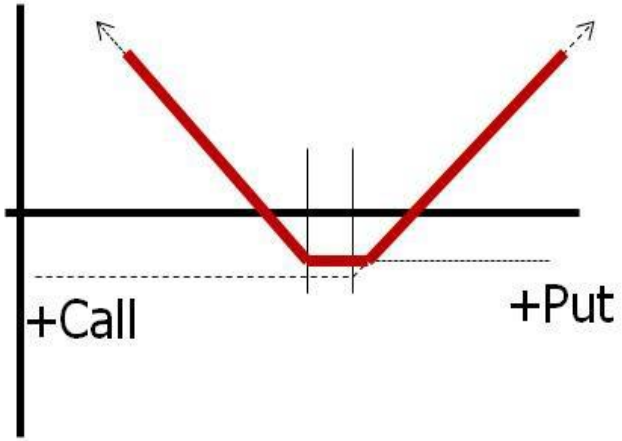
Long Straddle





Long Strangle





4. Spreads and Combinations

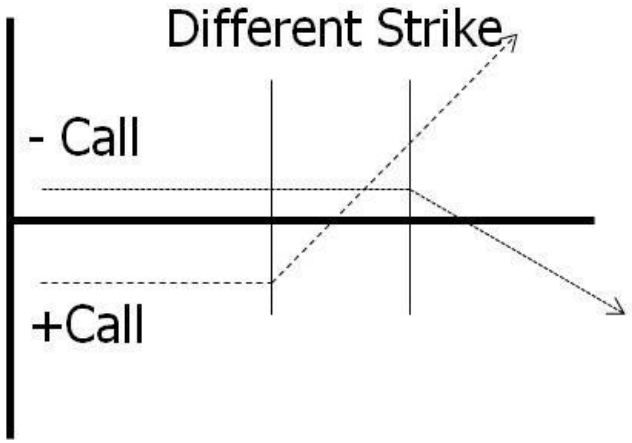
4.3 Bull Spreads and Bear Spreads

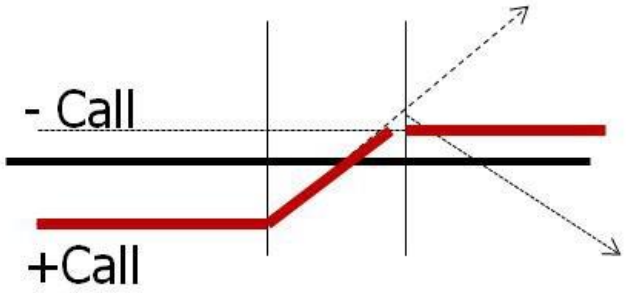
- Bull and bear spreads are positions that have equal numbers of long options on one strike and short options on a second strike. A spread will either be constructed using calls or using puts.
  - **Bull** spreads use **long** options on the **lower** strike (**Bull** = **Buy L**ow) and **short** options on the **higher** strike.
  - **Bear** spreads use **short** options on the **lower** strike and **long** options on the **higher** strike.
- Bear spreads are just short bull spreads, in fact

4. Spreads and Combinations

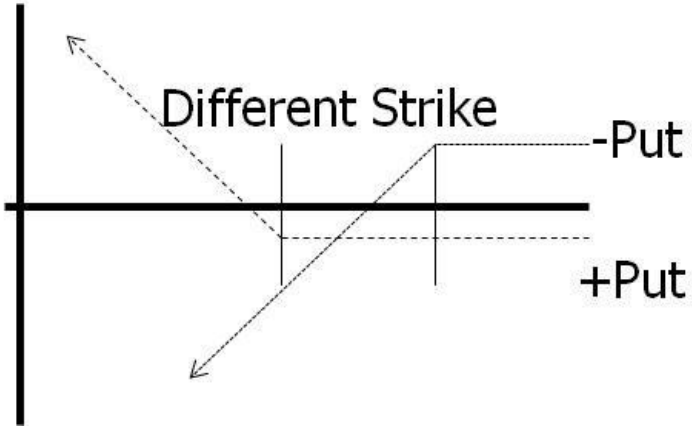
4.3 **Bull Spreads** and Bear Spreads

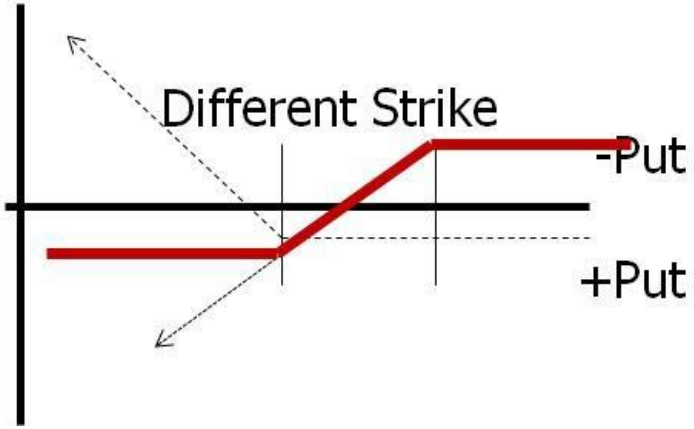
Bull Call Spread (Debit)





Bull Put Spread (Credit)

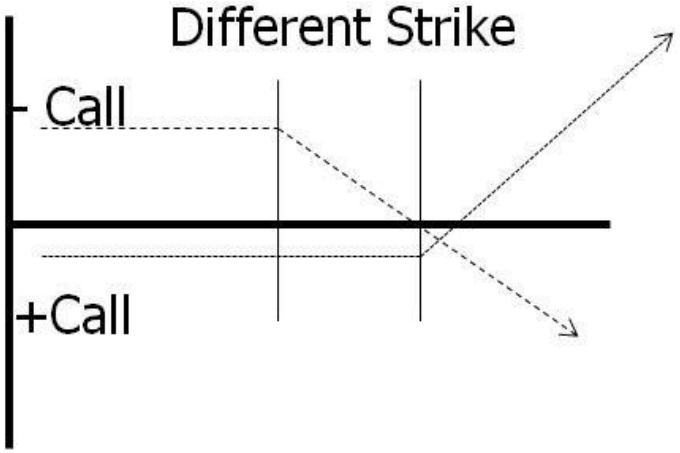


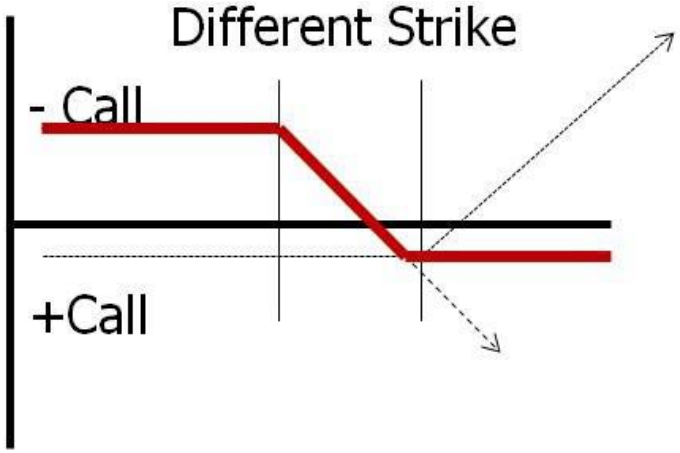


4. Spreads and Combinations

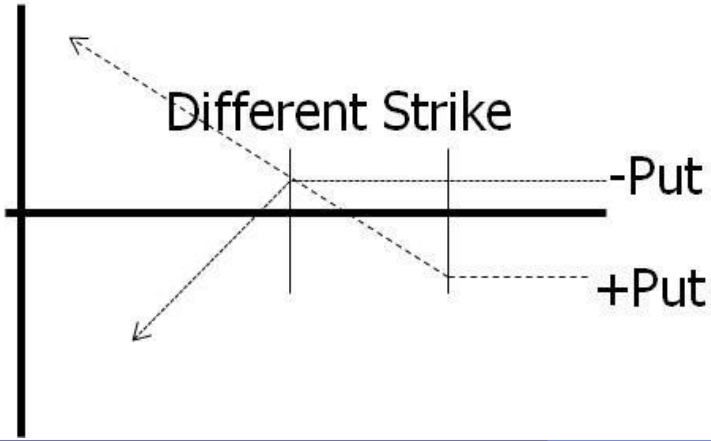
4.3 Bull Spreads and **Bear Spreads**

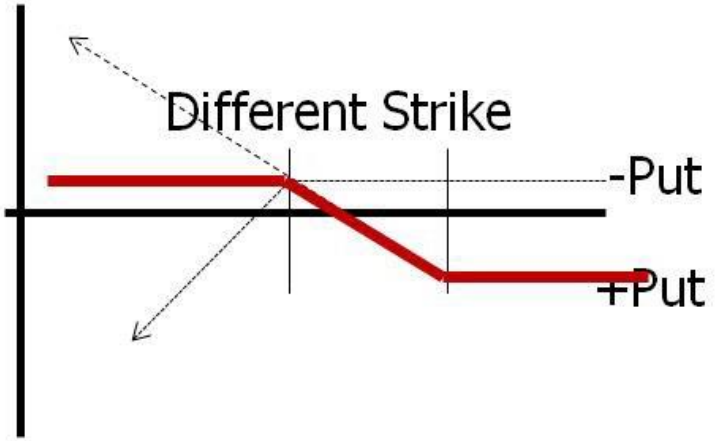
Bear Call Spread (Credit)





Bear Put Spread (Debit)





4. Spreads and Combinations

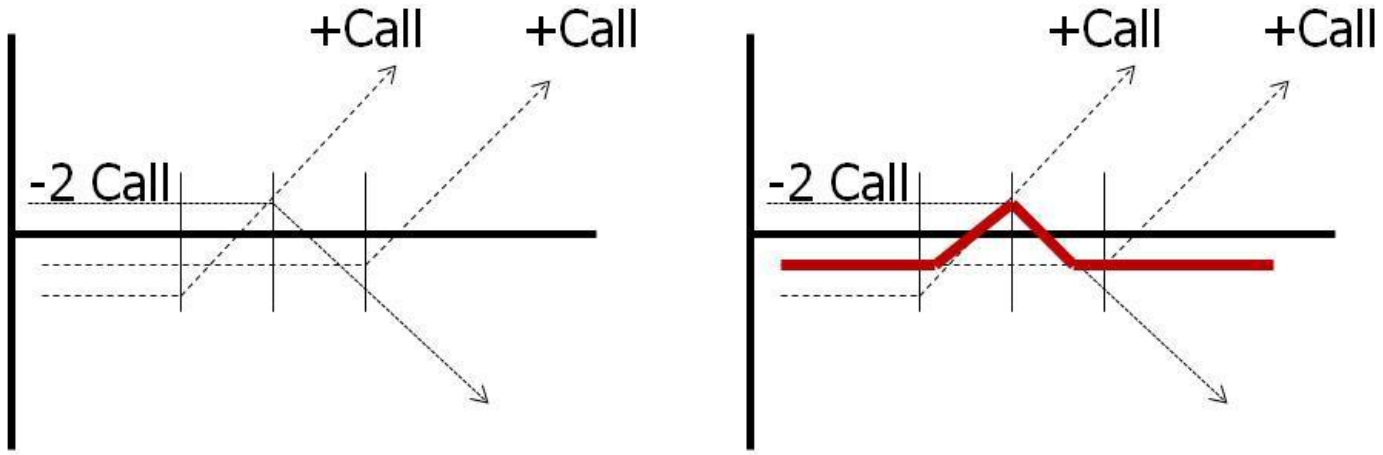
4.4 Butterfly/Condor

- Provide known and fixed maximum gain and loss.
- Usually used in cases of high implied volatility and expectations of range-bound underlyings.
- Implemented using puts or calls.
- Condors have a wider range of profit, but cost more.
- Take advantage of high implied volatility (seen as likely to fall) and time decay.
- Because they require three or four strikes, they are expensive in terms of commissions and/or contract fees

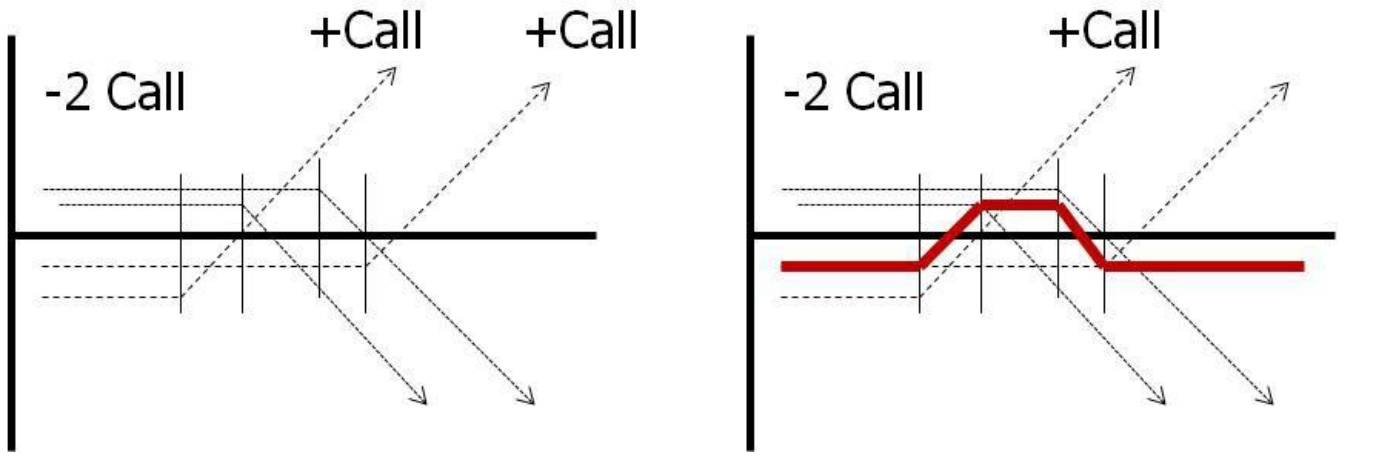
4. Spreads and Combinations

4.4 Butterfly/Condor

Long Butterfly



Long Condor



The Greeks

As you should recall, each is a ratio of absolute changes (in each case assuming only the named factor changes):

- **Delta** (Δ) = change in option **price** per +1 change in **stock price**. Delta is positive for (long) calls and negative for (long) puts.
- **Gamma** (Γ) = change in option **delta** per +1 change in **stock price.** Gamma is positive for (long) calls and for (long) puts.
- **Theta** (θ) = daily change in option **price** (effect of **time passing**). Theta is negative for (long) calls and (long) puts.
- **Vega** (v) = change in option **price** per +1% change in **volatility.** Vega is positive for (long) calls and for (long puts).

The Greeks

Taking the XYZ stock options as an example, below is the table of option premiums on 20 March (when the stock price was $52.14) as seen before, together with a table of deltas at the same point in time.

Call Price			Strike	Put Price		
APR	MAY	JUN	Price	APR	MAY	JUN
4.80	6.26	7.40	**50**	2.53	3.87	4.88
3.53	5.05	6.22	**52.5**	3.75	5.14	6.19
2.52	4.02	5.20	**55**	5.24	6.61	7.65

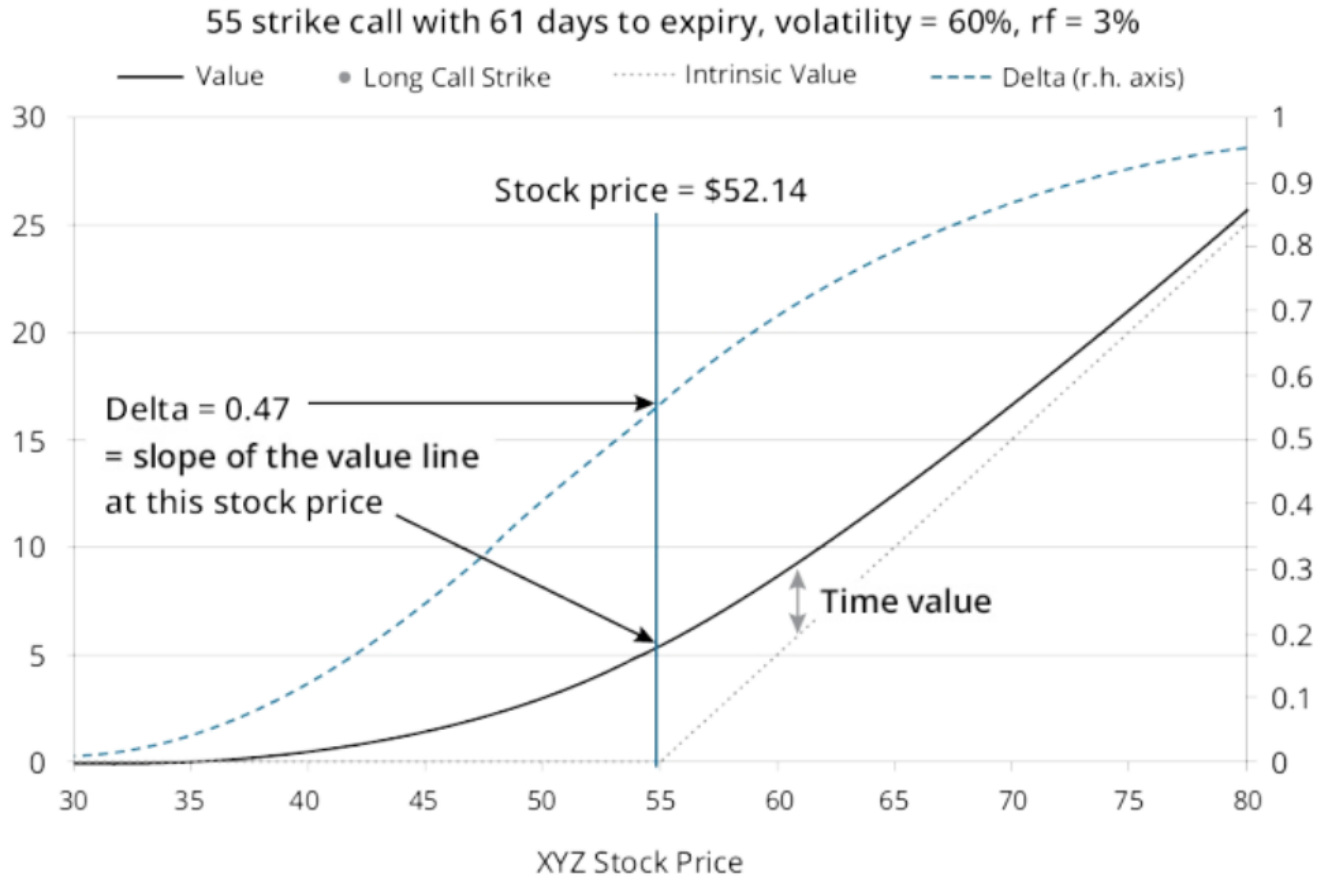
Call Delta			Strike	Put Delta		
APR	MAY	JUN	Price	APR	MAY	JUN
0.634	0.623	0.623	**50**	–0.366	–0.377	–0.377
0.525	0.546	0.560	**52.5**	–0.475	–0.454	–0.440
0.419	0.470	0.499	**55**	–0.581	–0.530	–0.501

For example, the MAY 55 call has a delta of 0.47, meaning that if the stock price rose by $1 to $53.14 then the MAY 55 call would rise, in principle, by $0.47, to $4.02 + $0.47 = $4.49.

Supposed that we recompute the MAY 55 call premium for the $53.14 stock price, the pricing model gives us a figure of $4.51, slightly higher than the $4.49 predicted by delta. This is because the option price line is not a straight line (other than at expiration), with a curvature measured by **gamma**, so delta itself varies with the underlying.

5. Delta and Gamma

The Greeks



The Greeks

Here is the corresponding table for the option gammas on 20 March (at the original stock price of $52.14):

Call Price			Strike	Put Price		
APR	MAY	JUN	Price	APR	MAY	JUN
4.80	6.26	7.40	**50**	2.53	3.87	4.88
3.53	5.05	6.22	**52.5**	3.75	5.14	6.19
2.52	4.02	5.20	**55**	5.24	6.61	7.65

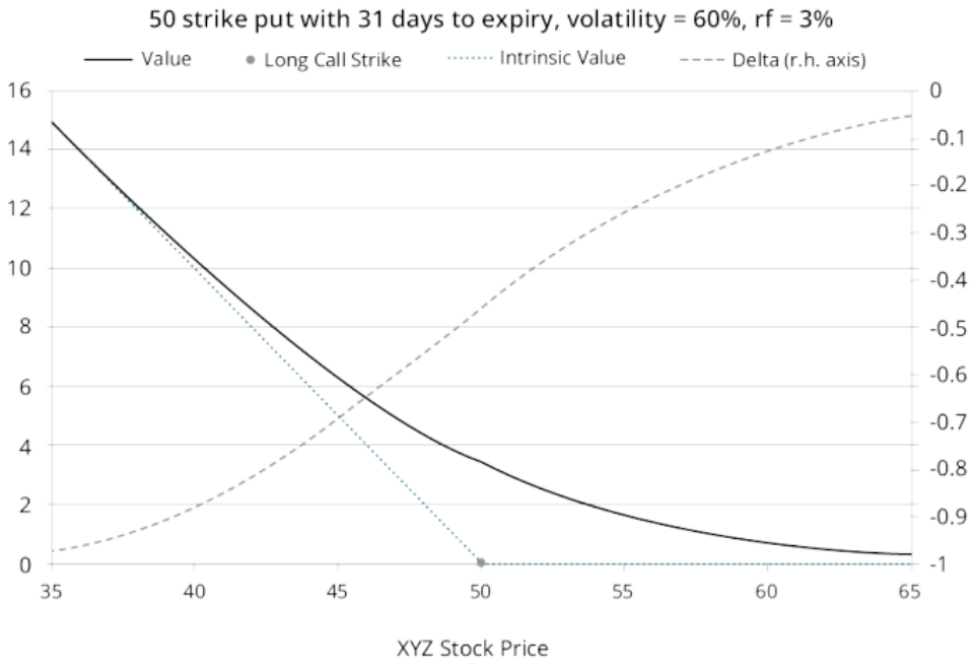
Call Gamma			Strike	Put Gamma		
APR	MAY	JUN	Price	APR	MAY	JUN
0.041	0.030	0.024	**50**	0.041	0.030	0.024
0.044	0.031	0.025	**52.5**	0.044	0.031	0.025
0.043	0.031	0.026	**55**	0.043	0.031	0.026

Call Delta			Strike	Put Delta		
APR	MAY	JUN	Price	APR	MAY	JUN
0.634	0.623	0.623	**50**	–0.366	–0.377	–0.377
0.525	0.546	0.560	**52.5**	–0.475	–0.454	–0.440
0.419	0.470	0.499	**55**	–0.581	–0.530	–0.501

For example, the MAY 55 call has a gamma of 0.031, meaning if the share price were $1 higher, the call's delta would be 0.031 higher: 0.470 + 0.031 = 0.501.

The Greeks

The same principles apply to puts, of course. The following graph shows value and delta for the XYZ APR 50 (long) put (also on 20 March):



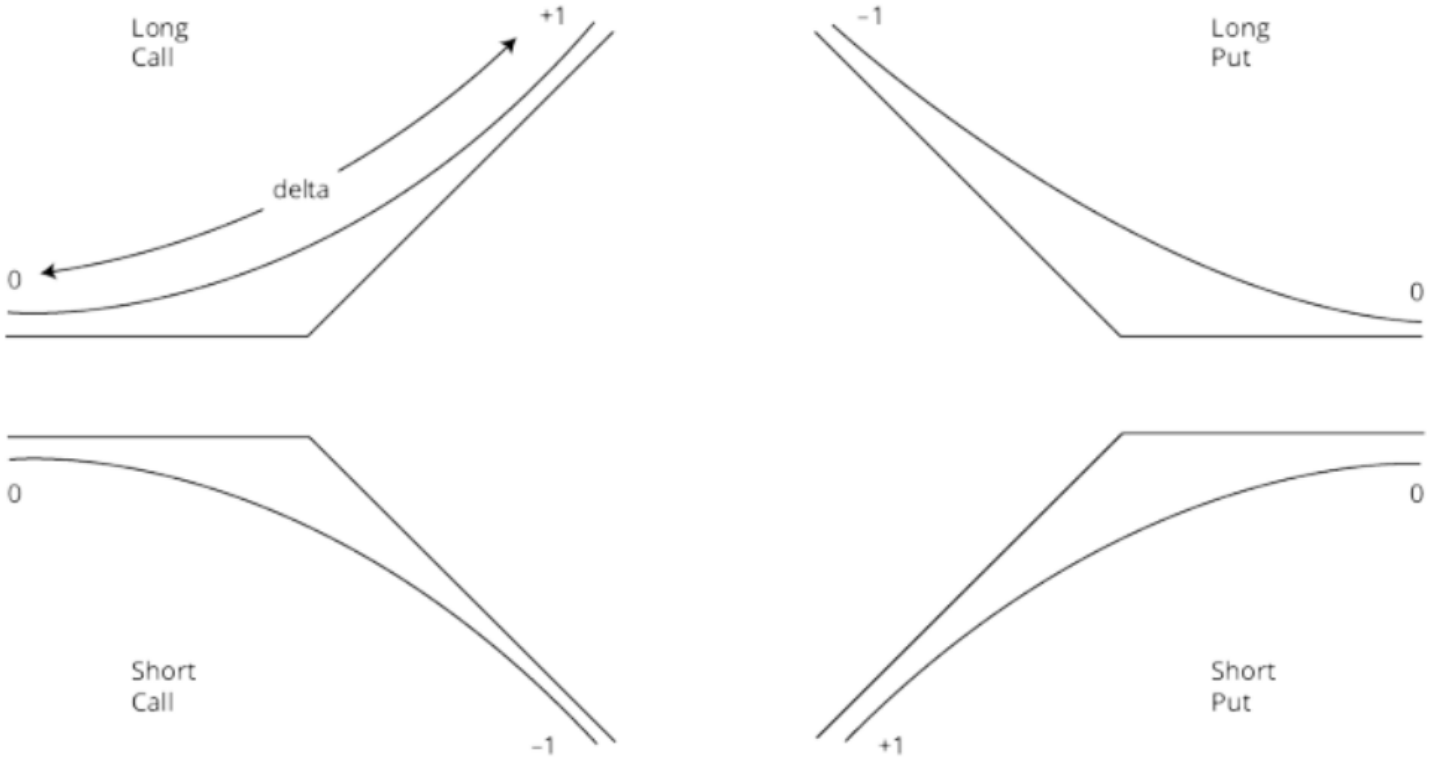
Puts (long) have negative delta, since the line slopes downwards, but there is a simple rule that applies to both calls and puts regarding the absolute size of delta (i.e. ignoring the sign):

All other factors held constant:

- The **more ITM** is an option, the **higher** is its (absolute) delta (closer to 1).
- The **more OTM** is an option, the **lower** is its (absolute) delta (closer to 0)

The Greeks

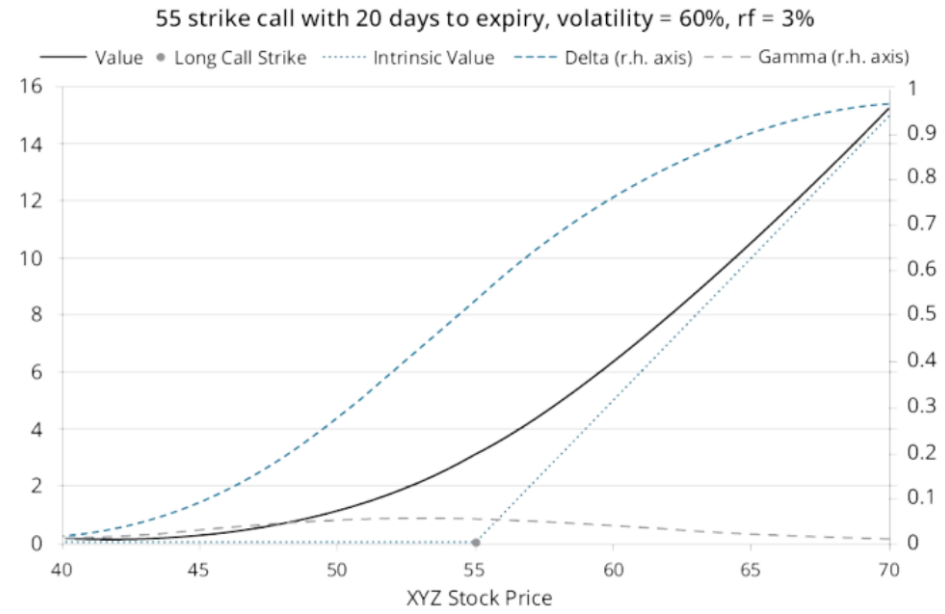
The following diagram summarizes the ranges of values of delta for long and short calls and puts:

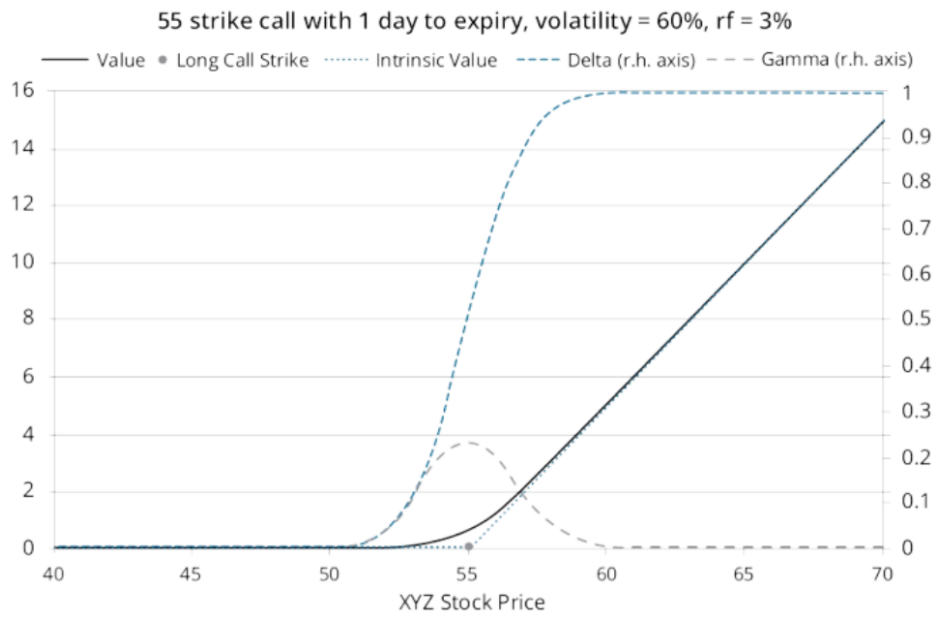


5. Delta and Gamma
The Greeks

The Greeks

Gamma is trickier to generalize, but it tends to be higher the closer to ATM an option, **and is at its greatest for ATM options that are close to expiration.**





6. Uses of Options in Portfolio Management

1. Covered Call Writing
2. Put Writing
3. Long Straddle
4. Collar
5. Hedging an Expected Increase in Equity Market Volatility
6. Establishing or Modifying Equity Risk Exposure

6.1 Covered Call Writing

Carlos Rivera is a portfolio manager in a small asset management firm focusing on high-net-worth clients. In mid-April, he is preparing for an upcoming meeting with Parker, a client whose daughter is about to marry. Parker and her husband have just decided to pay for their daughter's honeymoon and need to raise $30,000 relatively quickly. The client's portfolio is 70% invested in equities and 30% in fixed income and is by policy slightly aggressive. Currently the Parkers are "asset rich and cash poor," having largely depleted their cash reserves prior to the wedding expenses. The recently revised investment policy statement permits most option activity except the writing of naked calls.

Parker's account contains 5,000 shares of Manzana (MNZA) stock, a stock that she is considering selling in the near future. Rivera's firm has a bearish market outlook for MNZA shares over the next six months. Rivera reviews information on the 44-day exchange-listed options, which expire in May (shown in Exhibit 33). He is considering writing MNZA calls, which will accomplish two objectives. First, the sale of calls will generate the required cash for his client. Secondly, the sale will reduce the delta of Parker's account in line with his firm's bearish short-term outlook for MNZA shares. The current delta of Parker's MNZA position is 5,000(+1) or +5,000. Exhibit 33 contains call and put price information for May MNZA options with strike prices close to the current market price of MNZA shares (S_0 = $169).

Discuss the factors that Rivera should consider and the strategy he should recommend to Parker.

Manzana Inc. May Options With 44 Days to Expiration, MNZA Stock = $169

Call Premium	Call Delta	Exercise Price
12.55	0.721	160
9.10	0.620	165
6.45	0.504	170
4.03	0.381	175
2.50	0.271	180

6.2 Put Writing

Oscar Quintera is the chief financial officer for Tres Jotas, a private investment firm in Buenos Aires. He wants to purchase 50,000 MNZA shares for the firm, but at the current price he considers MNZA shares to be a bit expensive. The current share price is $169, and Quintera is willing to buy the stock at a price not higher than $165. Quintera decides to write out-of-the-money puts on MNZA shares.

Discuss the outcome of the transaction, a short position in MNZA May 165 puts, assuming two scenarios:

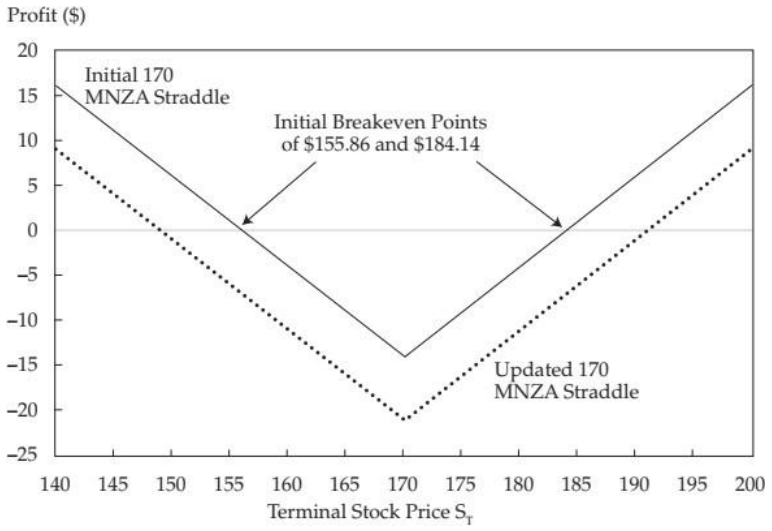
- Scenario A: MNZA is $163 per share on the option expiration day.
- Scenario B: MNZA is $177 per share on the option expiration day.

6.3 Long Straddle

Katrina Hamlet has been following Manzana stock for the past year. She anticipates the announcement of a major new product soon, but she is not sure how the critics will react to it. If the new product is praised, she believes the stock price will increase dramatically. If the product does not impress, she believes the share price will fall substantially. Hamlet has been considering trading around the event with a straddle. The stock is currently priced at $169.00, and she is focused on close-to-the-money (170) calls and puts selling for 6.45 and 7.69, respectively. Her initial strategy is presented as Exhibit 36.

Hamlet expects that the stock will move at least 10% either way once the product announcement is made, making the straddle strategy potentially appropriate. The vega of her position would be 0.234 + 0.234= +0.468, meaning a 1% move in the options' volatility would result in a gain of about $0.468 in the value of the straddle. The straddle's delta would be approximately zero, at +0.01 (Call Delta + Put Delta = (0.504 + [–0.494]). This strategy is long volatility. After the market close, Hamlet hears a news story indicating that the product will be unveiled at a trade show in two weeks. The following morning after the market opens, she goes to place her trade and finds that although the stock price remains at $169.00, the option prices have adjusted upward to $10.20 for the call and $10.89 for the put.

Discuss whether the new option premiums have any implications for Hamlet's intended straddle strategy.



6.4 Collar

Bernhard Steinbacher has a client with a holding of 100,000 shares in Tundra Corporation, currently trading for €14 per share. The client has owned the shares for many years and thus has a very low tax basis on this stock. Steinbacher wants to safeguard the position's value because the client does not want to sell the shares. He does not find exchange-traded options on the stock. Steinbacher wants to present a way in which the client could protect the investment portfolio from a decline in Tundra's stock price.

Discuss an option strategy that Steinbacher might recommend to his client.

6.5 Hedging an Expected Increase in Equity Market Volatility

Jack Wu is a fund manager who oversees a stock portfolio valued at US$50 million that is benchmarked to the S&P 500. He expects an imminent significant correction in the US stock market and wants to profit from an anticipated jump in short-term volatility to hedge his portfolio's tail risk.

The VIX Index is currently at 14.87, and the front-month VIX futures trades at 15.60. Wu observes the quotes shown in Exhibit 40 for options on the VIX (these options have same implied volatility). It is important to note that VIX option prices reflect the VIX futures prices. Given that the VIX futures trade at 15.60 while the spot VIX is 14.87, the call is at the money while the put is out of the money by 5.45% (= [14.75 – 15.60]/15.60).

At maturity, the options' payoffs will depend on the settlement price of the relevant VIX futures contracts. The options will expire one month from now, and the contract size is 100.

Discuss the following:

1. A strategy Wu can implement to hedge tail risk in his equity portfolio, by taking advantage of his expected increase in volatility while lowering his hedging cost
2. Profit and loss on the strategy at options expiration
3. Relevant issues and advantages of this strategy

Note: VIX is a measure of expected future volatility

Exhibit 40 Options on VIX Index

	Call Option	Put Option
Option Strike	15.60	14.75
Option Price	2.00	1.55

6.6 Establishing or Modifying Equity Risk Exposure (1/2)

Armando Sanchez is a private wealth advisor working in London. He expects the shares of Markle Co. Ltd. will move from the current price of £60 a share to £70 a share over the next three months, thanks to an increase of positive news flows regarding the company's new fintech services. He also expects that the implied volatilities of options on Markle's stock will stay almost unchanged over the same period. Prices for three-month call options on the stock are shown in Exhibit 42 (note that each call contract represents one share). For his high-net-worth clients whose investment policy statements allow the use of derivatives, Sanchez plans to recommend that they purchase the call option that, based on the budget they intend to spend for implementing the strategy, would maximize profits if the stock price increases to £70 a share or more over the next three months.

Exhibit 42 Three-Month Call Options on Markle Co. Ltd.

	Option A	Option B	Option C
Strike	£58.00	£60.00	£70.00
Price	£4.00	£3.00	£0.40
Delta	0.6295	0.5227	0.1184
Gamma	0.0304	0.0322	0.0160

Discuss the option strategy that Sanchez should recommend to his clients.

6.6 Establishing or Modifying Equity Risk Exposure (2/2)

Investors use protective puts, collars, and equity swaps against a long stock position to hedge market risk. Here we turn to a practical application of protective puts.

Eliot McLaire manages a Glasgow-based hedge fund that holds 100,000 shares of Relais Corporation, currently trading at €42.00.

Situation A: Before Relais Corporation's quarterly earnings release: Relais has a quarterly earnings announcement scheduled in one week. Although McLaire expects an earnings increase, he believes the company will miss the consensus earnings estimate, in which case he expects that the maximum drawdown from the current price of €42.00 would be 10%. He would like to protect the fund's position in the company for several days around the earnings announcement while keeping the cost of the protection to a minimum. Exhibit 43 provides information on options prices for Relais Corporation. Note that each put contract represents one share.

Exhibit 43 One-Month Put Options on Relais Corporation

	Option A	Option B	Option C
Strike	€40.00	€42.50	€45.00
Price	€1.45	€1.72	€3.46

Swaps, Forwards, and Futures Strategies

Managing Interest Rate Risk – IRS, FRA, and Interest Rate Futures

Interest Rate Swap

Interest Rate Swap:

- A **payer swap** is a contract to make a series of fixed-rate payments and receive a series of floating-rate payments, both based on a specified notional principal (amount).
  - If future floating rates are higher than rates expected at the initiation of a swap, a payer swap will increase in value.
  - A payer swap will decrease in value if future floating rates are less than expected.

- A **receiver swap** is the counterparty to a payer swap and will receive the fixed rate payments and make the floating-rate payments. In practice, the payments from each party to a swap are netted (the party that owes the larger amount pays the difference) to reduce credit risk.

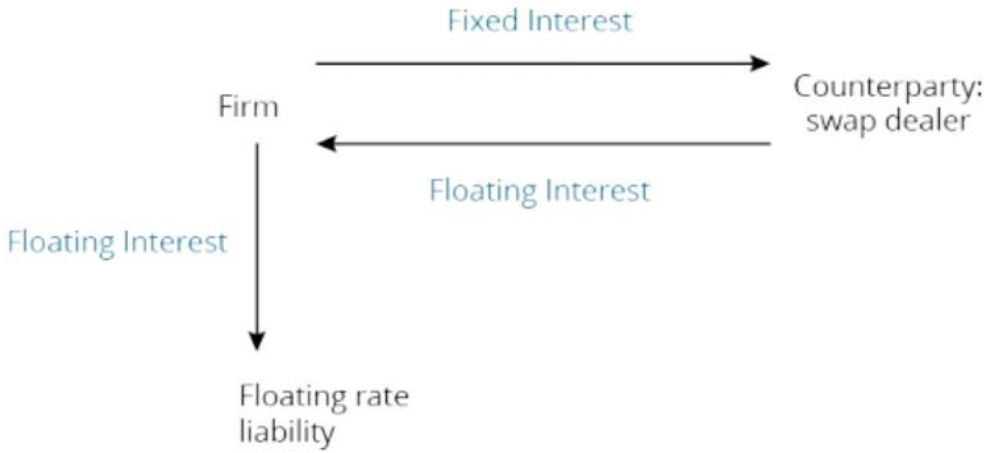
- The floating-rate payment for the first settlement date is known at contract initiation, but the floating-rate payments for future settlement dates are not.

- A quarterly pay swap, for example, has quarterly settlement dates with floating-rate payments based on a quarterly reference rate such as 90-day LIBOR.

Managing Interest Rate Risk – IRS, FRA, and Interest Rate Futures

Interest Rate Swap

A company with a floating-rate exposure can use a payer swap (pay fixed, receive floating) to change it into a fixed-rate exposure. The swap must have settlement date that match the payment dates of the floating-rate liability.



Existing Exposure	Converting	Interest Rate Swap Required	Beneficial When
Floating-rate liability	Floating to fixed	Payer swap	Floating rates expected to rise
Fixed-rate liability	Fixed to floating	Receiver swap	Floating rates expected to fall
Floating-rate asset	Floating to fixed	Receiver swap	Floating rates expected to fall
Fixed-rate asset	Fixed to floating	Payer swap	Floating rates expected to rise

Managing Interest Rate Risk – IRS, FRA, and Interest Rate Futures

Currency Swaps

Managing Currency Exposure: Currency Swaps –

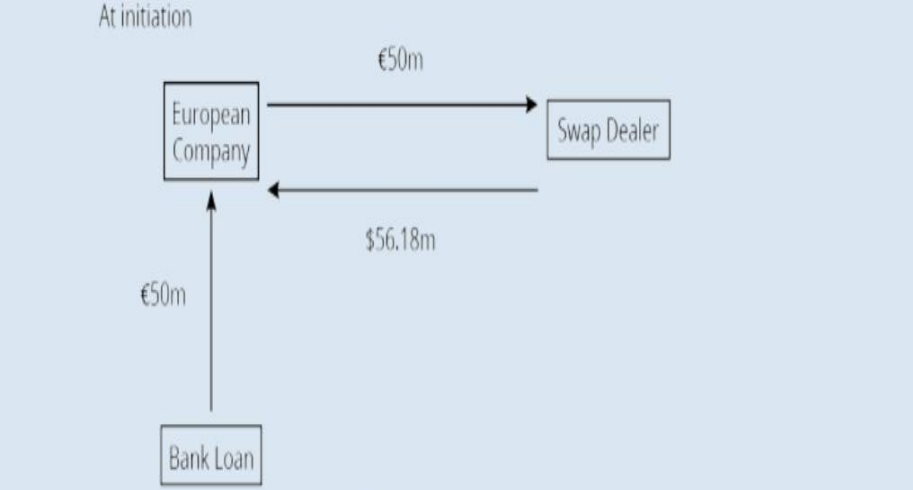
- In a currency swap, one party agrees to make periodic interest rate payments on a notional amount in one currency, while the other party agrees to make period interest payments on a notional amount in another currency.
- The notional amounts are equivalent based on the exchange rate at the inception of the swap. Currency swaps allow borrowers requiring foreign currency to effectively borrow in a foreign currency. This may be advantageous to a company that will invest in a foreign asset that will generate foreign currency cash flows.
- The firm may not have good access to capital markets in the foreign country. A currency swap will allow the firm to hedge its currency risk from the foreign-currency cash flows. This is known as synthetic borrowing.
- The parties to a currency swap may exchange only interest payments, but they may also exchange the notional amounts of each currency at the beginning and the end of the swap. This second case is known as a **cross-currency basis swap**. The periodic payments on a currency swap may be fixed or floating, but the typical swap is floating for floating.

Managing Interest Rate Risk – IRS, FRA, and Interest Rate Futures

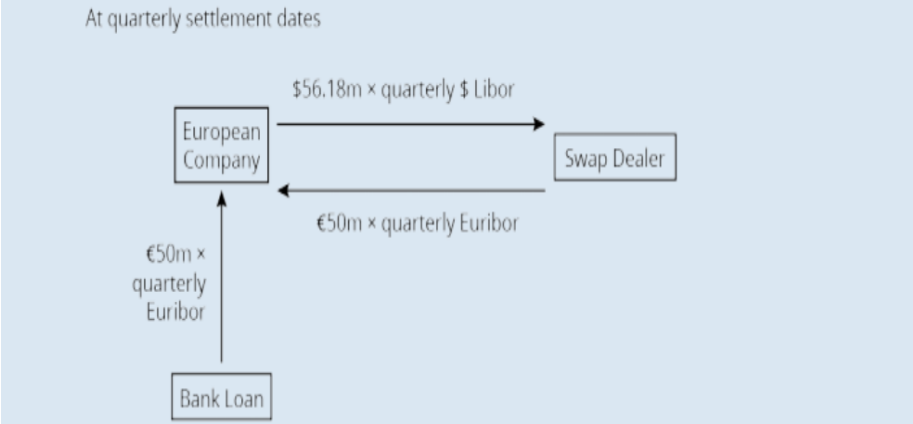
Currency Swaps

Example Cross Currency Basis Swaps

A euro-based company requires USD but does not have access to direct USD borrowing or finds it prohibitively expensive. The company decides to borrow in euros at 90-day Euribor and enter into a cross currency basis swap to USD based on 90-day USD LIBOR (a floating-for-floating swap). The swap has a tenor of two years with quarterly settlement. The principal on the euro loan is €50 million and the $/€ exchange rate at initiation of the swap is $1.1236.

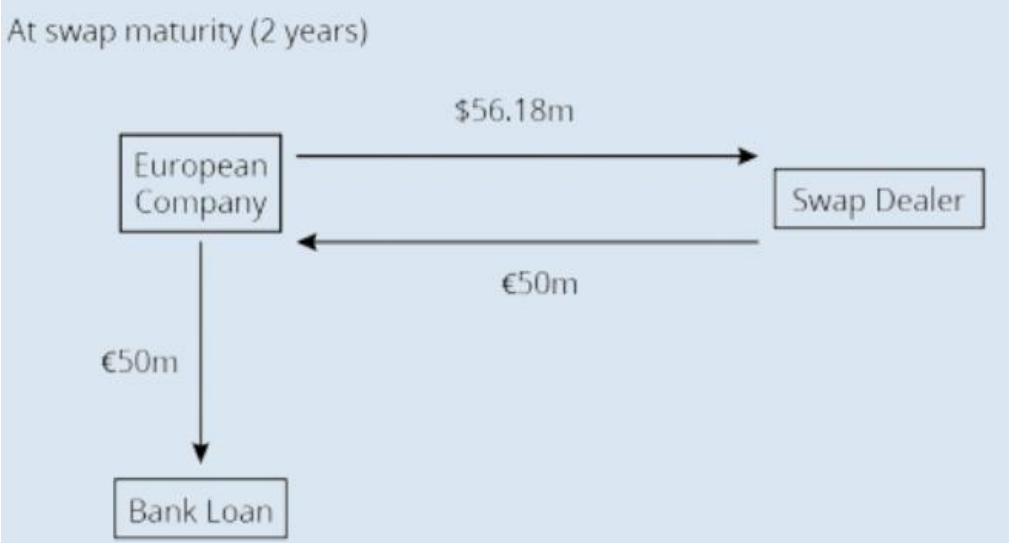


The euro-based company borrows €50 million and exchanges it for €50 million × 1.1236 = $56.18 million.



Each counterparty pays variable interest for the currency they initially received. The euro-based company will be paying USD interest to the swap dealer. The swap dealer will be paying the euro interest to the company, which will then use it to service the interest on its loan with the bank.

Example Cross Currency Basis Swaps



At the swap's expiration, the notional principal amounts are exchanged. The amounts are the same as those exchanged initially; changes in the exchange rate over the life of the swap do not affect these amounts, so there is no uncertainty (exchange rate risk) on the principal flows. The European company receives the €50 million and uses it to repay its bank loan.

In this swap, the European company is described as the dollar payer and the swap dealer as the euro payer (i.e., the description relates to the interest flows and final principal payment, not the swap of initial principal).

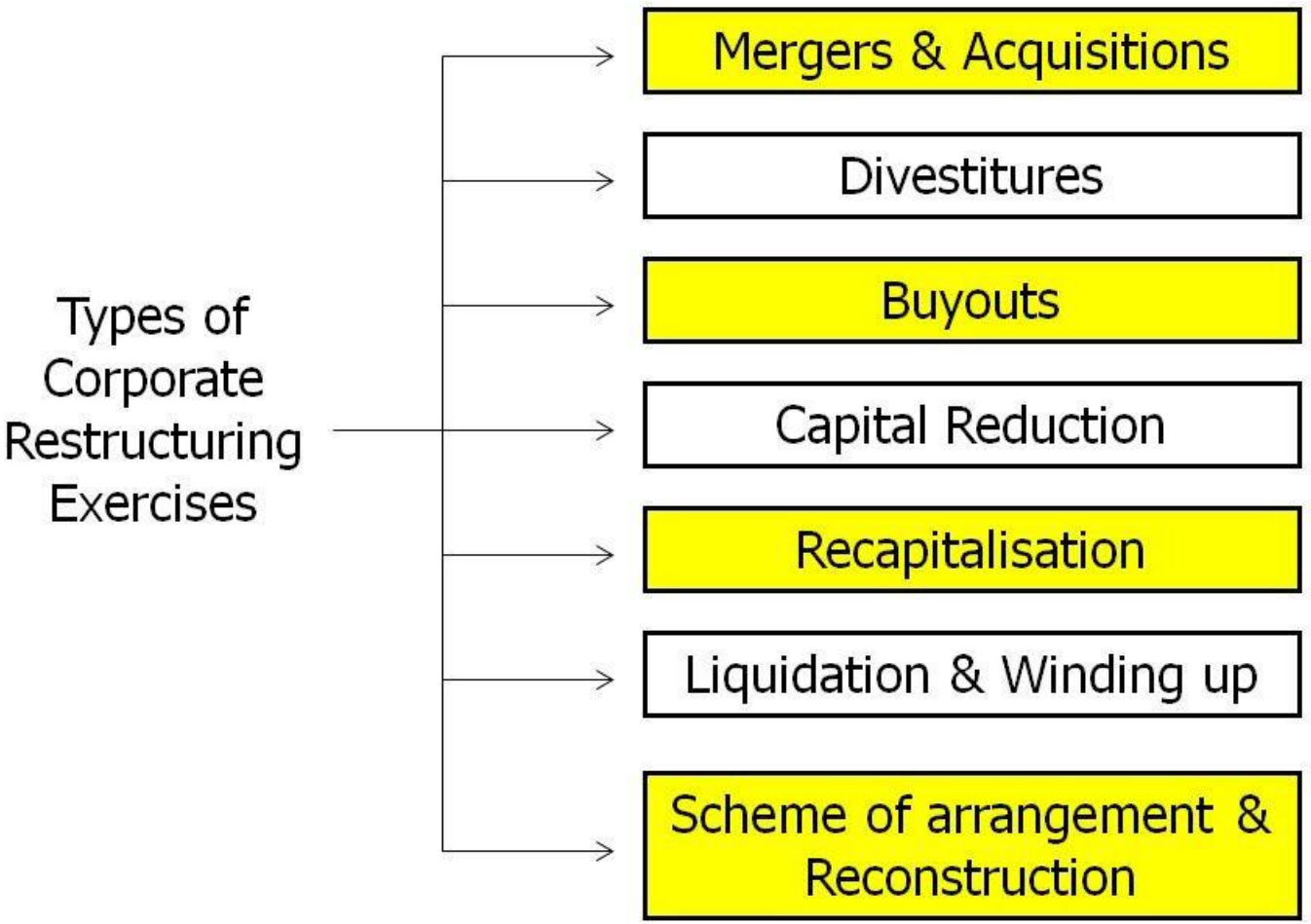
Example Cross Currency Basis Swaps

Boivis Patisseries Sarl is a French chain of patisseries that has an extensive network of shops in continental Europe. As part of their expansion strategy, they are looking to set up shops in the United States. Boivis estimates that it will initially require $50 million to set up shops and cover working capital requirements. The finance directors at Boivis have looked at directly borrowing in USD but have found that costs would be $LIBOR + 100 BP. The decision is made to borrow for four years in euros at a rate of Euribor + 60 BP with interest paid quarterly and enter a currency swap to exchange euros for dollars. Basis on the Eurodollar swap is being quoted at –20 basis points (–20 BP). The swap pays variable interest on both legs on a quarterly settlement basis. The current $/€ exchange rate is $1.1815. Three-month Euribor is 1.5% and $LIBOR is 2.0% at swap initiation. Three months later at the first settlement date, three-month Euribor is 1.6% and $LIBOR is 1.9%.

1. Compute the principal flows exchanged at the start and end of the swap's tenor.
2. Compute the interest payments at the first and second settlement dates on the swap and the cost to Boivis for its synthetic dollar loan.

Topic 16: Corporate Restructuring and Mergers and Acquisitions

Corporate Restructuring Exercises

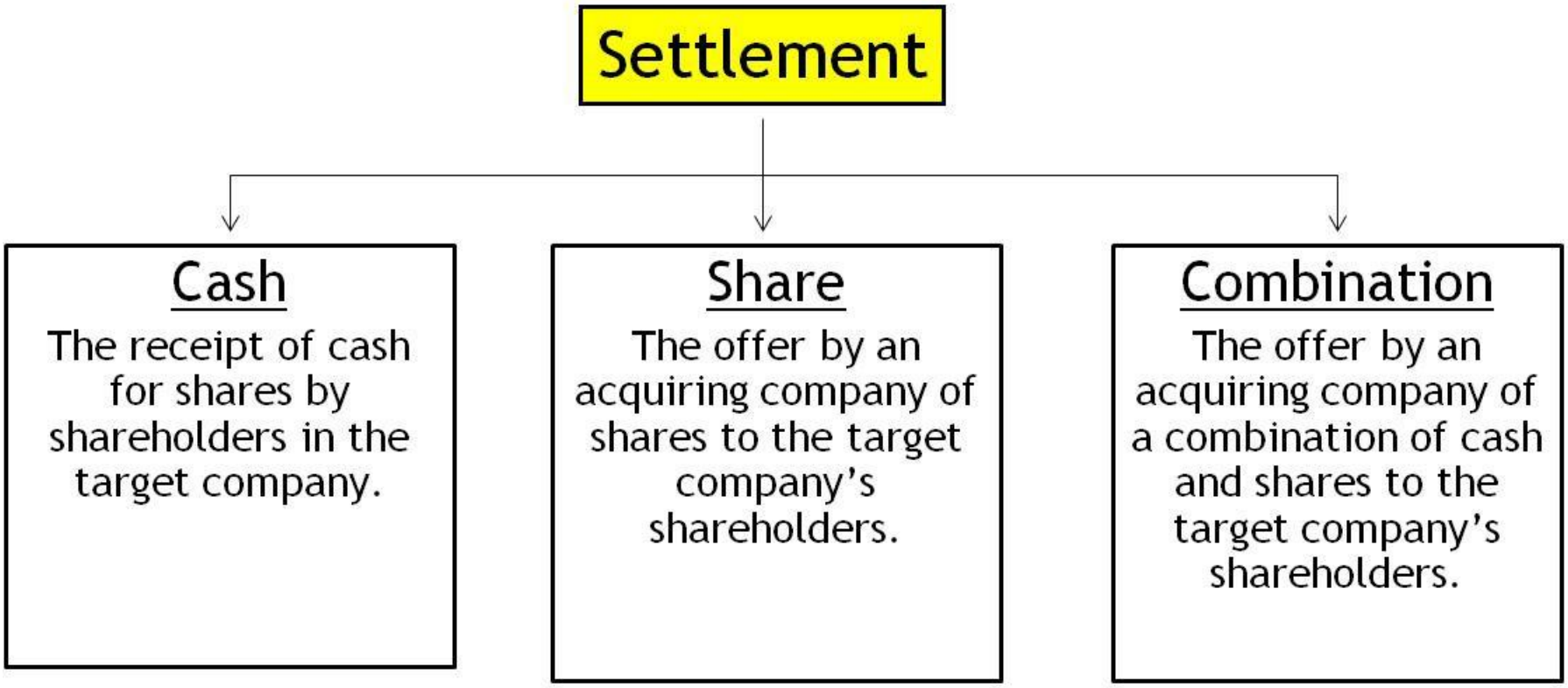


Mergers and Acquisitions

Takeover	Transfer of control from one ownership group to another
Acquisition	The purchase of one firm by another
Merger	- Combination of two firms into a new legal entity - A new company is created.
Amalgamation	- A genuine merger in which both sets of shareholders must approve the transaction - Requires a fairness opinion by an independent expert on the true value of the firm's shares when a public minority exists

Mergers and Acquisitions

Financing M&A

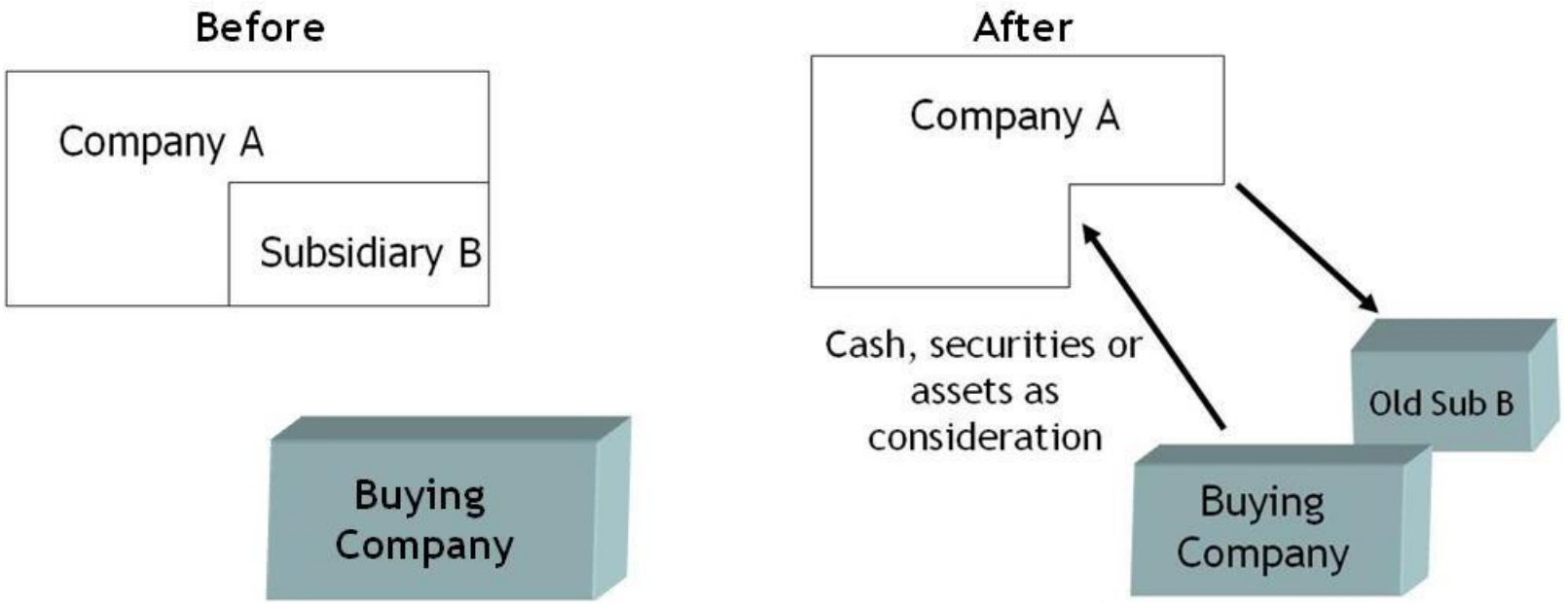


Mergers and Acquisitions
Factors to consider – M&A

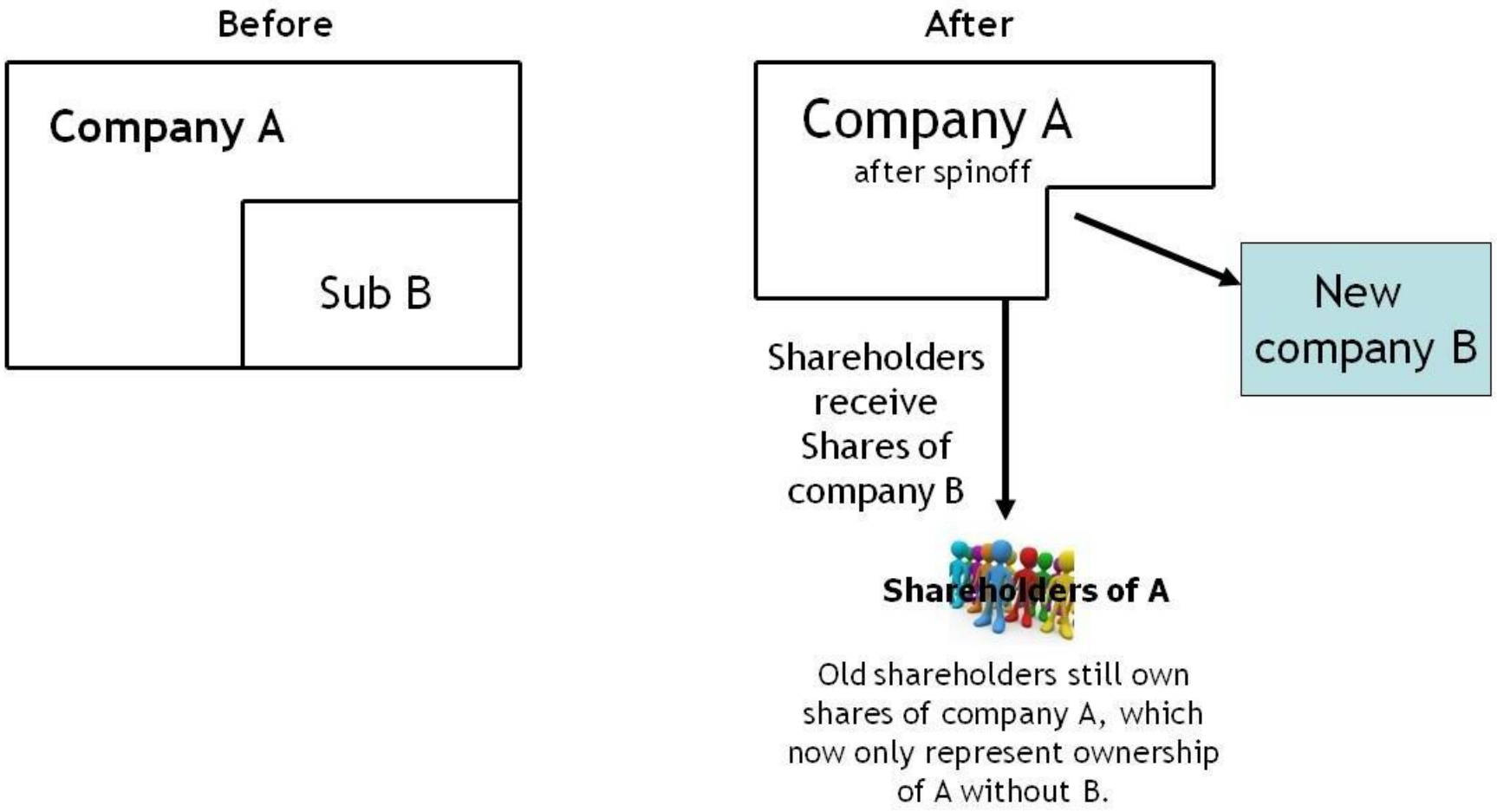
- Add shareholder value as going concern or Survival
- Shareholders – equity: dilute, consolidate
- Earnings – dilute, strengthen, cost of debt
- Market – expand, niche, defend
- Management – strengthen, dispute, payoff cost
- Timing – quick or long drawn out
- Regulatory approvals

Divestitures

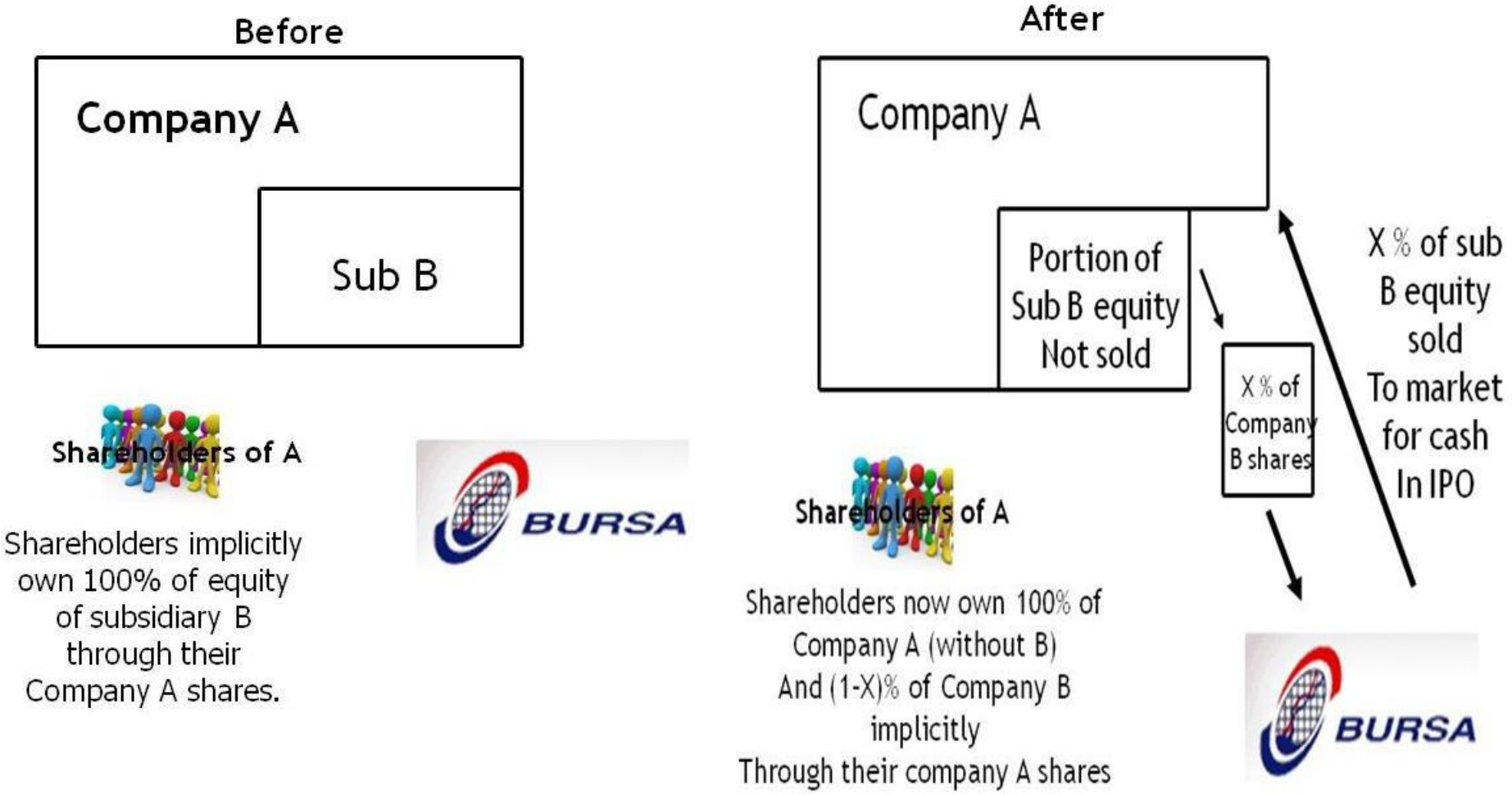
Selling assets, divisions, subsidiaries to another corporation or combination of corporations or individuals



Spin offs


Before
Company A
Sub B
After
Company A
after spinoff
New company B
Shareholders receive Shares of company B
Shareholders of A
Old shareholders still own shares of company A, which now only represent ownership of A without B.

Equity carve out (partial IPO)



Motivations for transactions

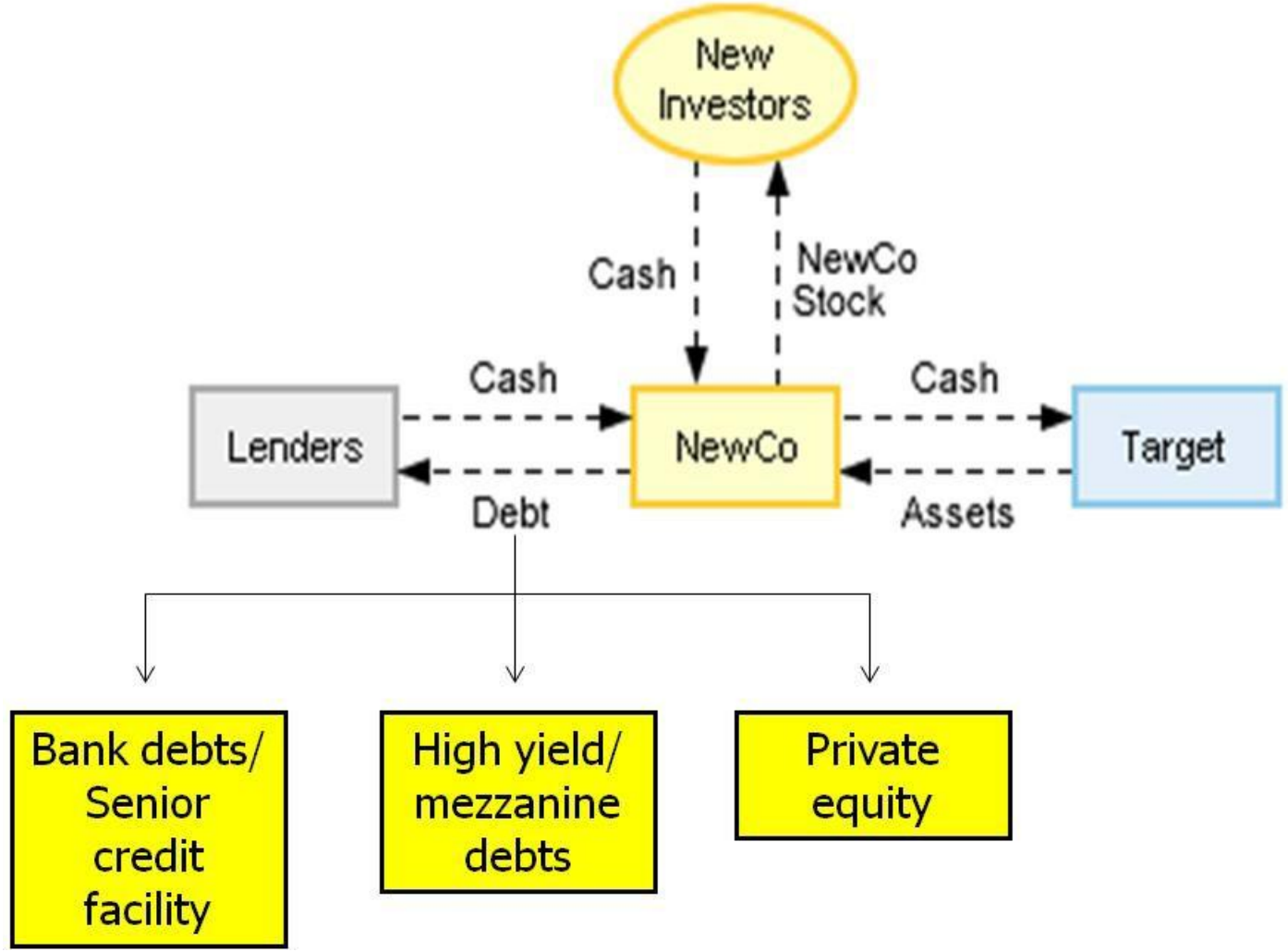
1. **Market for corporate control**
   - Asset are more valuable to alternative management team
     - Divestiture, spin off, carve out, tracking stock

2. **Unlocking hidden value**
   - Stock market problem or management problem?

3. **Improving management incentives**
   - Divestiture, spin off, carve out, tracking stock

4. **Agency costs**
   - Divestiture, spin off, carve out, tracking stock

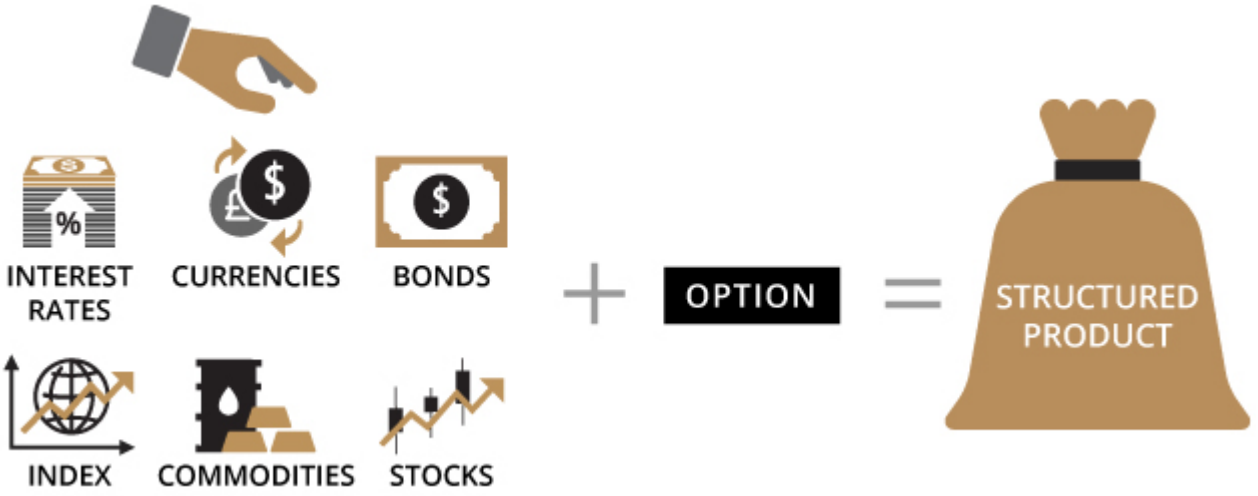
Leveraged Buyout



Desirable Characteristic of Buyout

1. **Strong, predictable operating cash flows** with which the leveraged company can service and pay down acquisition debt
2. **Mature, steady (non-cyclical),** and perhaps even boring
3. Well-established business and products and **leading industry position**
4. **Moderate CapEx and product development (R&D) requirements** so that cash flows are not diverted from the principle goal of debt repayment
5. Limited **working capital** requirements
6. Strong **tangible asset** coverage
7. **Undervalued** or out-of-favor
8. **Seller** is motivated to **cash out** of his/her investment or divest non-core subsidiaries, perhaps under pressure to maximize shareholder value
9. **Strong management team**
10. Viable **exit strategy**

Topic 17: Structured Products



1. Introduction
What are Structured Products?

- **Different Name, Same Product**

  Structured Product = Structured Investment = Structured Deposit = Structured Note

  1. Different ways of wrapping the same product
  2. Different regulatory and legal regime
  3. “Structured” suggests that products have undergone some form of financial engineering

- **What are they**

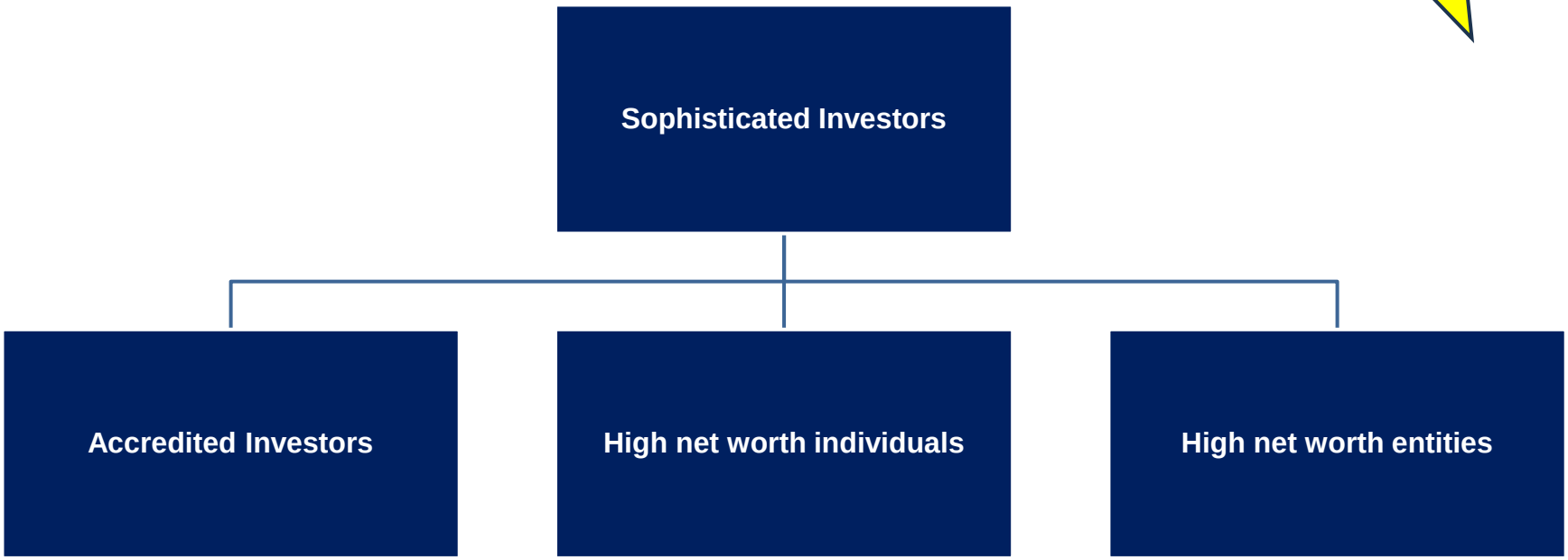
  1. Hybrid products whose performance is linked to a selected underlying asset, e.g. index.
  2. Usually a debt instrument (bond/deposit/debenture) with derivative(s) embedded.
  3. Offer interesting variations of Risk-Return profiles that are different from conventional instruments (asset classes) like bonds, equities, currencies, etc.
  4. Relatively complex multi-asset financial products.
  5. Payoff formula is usually well-defined.
  6. Linked underlying asset can be equity, FX, funds, etc. or combination of several assets.
  7. Sometimes viewed as a separate Asset Class.
  8. Asset-backed securities (ABS), REITs, ETFs are excluded.

1. Introduction

Who can invest in Structured Products?

In Malaysia, offered to sophisticated investors:

Effective 5th Feb 2024



Sophisticated Investors
3 Categories

- **Accredited Investor**
  1. A unit trust scheme, private retirement scheme or prescribed investment scheme.
  2. Bank Negara.
  3. A licensed person or a registered person.
  4. An exchange holding company, a stock exchange, a derivatives exchange, an approved clearing house, a central depository or a recognized market operator.
  5. A corporation that is licensed, registered or approved to carry on any regulated activity or capital market services by an authority in Labuan or outside Malaysia which exercises functions corresponding to the functions of the SC.
  6. A bank licensee or an insurance licensee as defined under the Labuan Financial Services and Securities Act 2010 [Act 704].
  7. An Islamic bank licensee or a takaful licensee as defined under the Labuan Islamic Financial Services and Securities Act 2010 [Act 705].
  8. A chief executive officer or a director of any person referred to in subparagraphs (iii), (iv), (v), (vi) and (vii) above.
  9. A closed-end fund approved by the SC.

- **High-Net Worth Entity (HNWE)**
  1. A company that is registered as a trust company under the Trust Companies Act 1949 and has assets under its management exceeding >RM10 m or its equivalent in foreign currencies.
  2. A corporation that—
     - is a public company under the Companies Act 2016 which is approved by the SC to be a trustee under the CMSA and has assets under its management, exceeding RM10 m or its equivalent in foreign currencies; or
     - is carrying on the regulated activity of fund management solely for the benefit of its related corporations and has assets under its management exceeding RM10 m or its equivalent in foreign currencies.
  3. A corporation with total net assets exceeding RM10 m or its equivalent in foreign currencies based on the last audited accounts.
  4. A partnership with total net assets exceeding RM10 m or its equivalent in foreign currencies.
  5. A statutory body established under any law whose function or mandate is investment in capital market products.
  6. A pension fund approved by the Director General of Inland Revenue under the Income Tax Act 1967.

Sophisticated Investors
3 Categories

- **High-Net Worth Individual (HNWI)**

  An individual—

  1. whose total net personal assets > RM 3 million or its equivalent in foreign currencies, provided that the net value of the primary residence of the individual contribute not more than RM 1 m of the total net assets;
  2. whose total net joint assets with—
     - (a) his or her spouse; or
     - (b) his or her child,

     exceeding RM 3 m or its equivalent in foreign currencies, provided that the net value of the primary residence of the individual with his or her spouse or child contribute not more than RM 1 m of the total net assets;
  3. who has a gross annual income exceeding RM300,000 or its equivalent in foreign currencies in the preceding 12 months;
  4. who jointly with his or her spouse or child, has a gross annual income exceeding RM400,000 or its equivalent in foreign currencies in the preceding 12 months;
  5. whose total net personal investment portfolio or total net joint investment portfolio with his or her spouse or child, in any capital market products exceeding RM 1 m or its equivalent in foreign currencies;
  6. Holds qualifications (bachelors/masters in Finance, Econs, Actuarial/Acc) and memberships in professional associations (eg CFA, AICB, MIA etc)

1. Introduction

Issuers of Structured Products in Malaysia

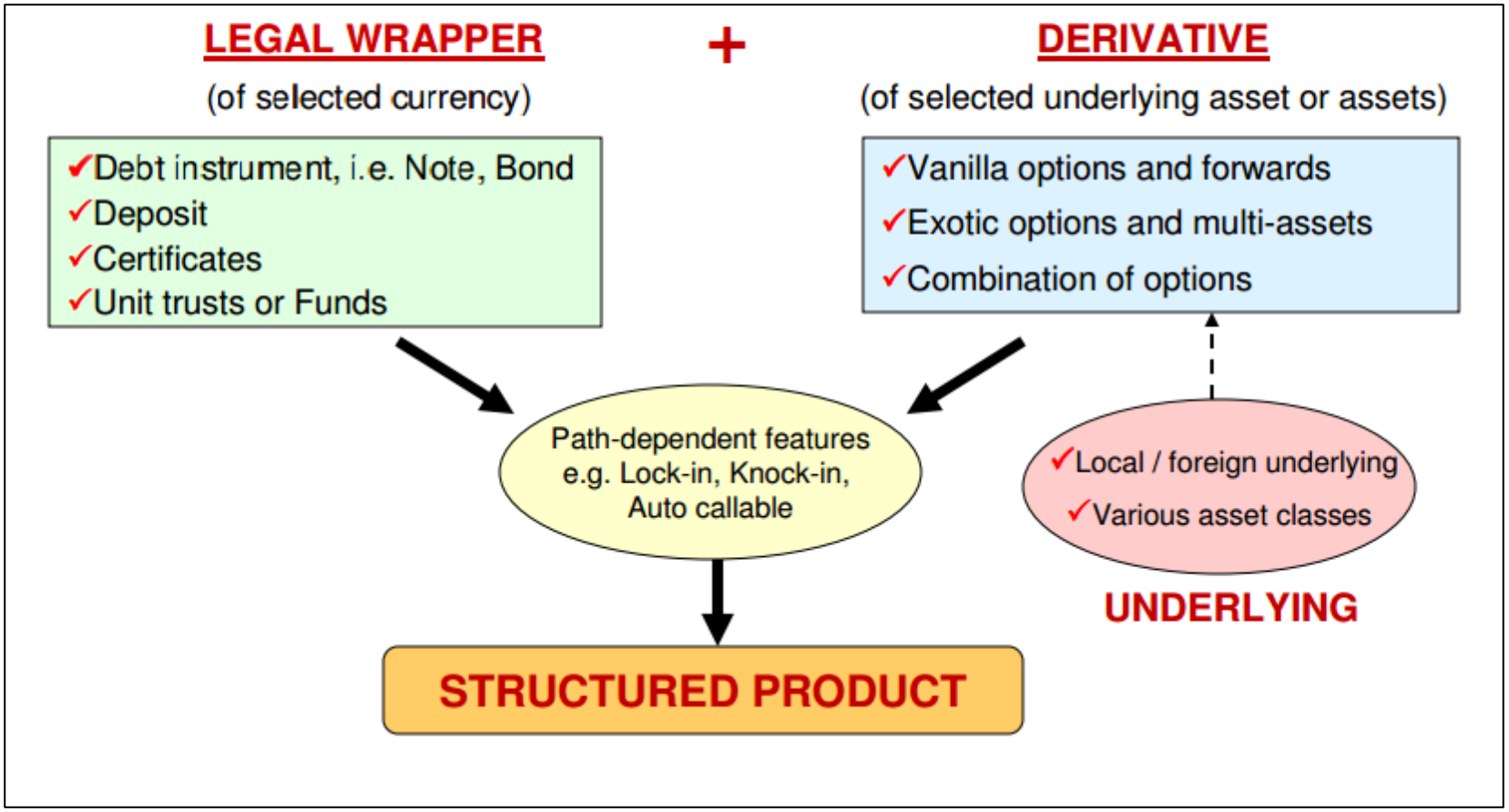
Eligible issuers of structured products according to LOLA:

Qualified Banks	Qualified Dealers	SPV	Cagamas

• Licensed Bank
• Licensed Islamic Bank
• Licensed IB
	• Holders of CMSL for dealing in Securities under CMSA:
	  • Universal Broker
	  • 1+1 broker
	  • Special scheme broker
		• Locally incorporated SPV sponsored by a qualified bank/ dealer	• Cagamas and Cagamas incorporated SPVs

2. Components of a Structured Product

Basic Building Blocks



3. Uses and Benefits of Using Structured Products

Motivation

1. **Efficient execution of market view**
   - ✓ Residual risk can be laid off (“sold”) in return for extra return.
   - ✓ Or giving up some return in exchange for protection against certain risk.
   - ✓ Remember the Bottom line: No Free Lunch !

2. **Ability to modify and customise the investor’s Risk-Return profile.**
   - ✓ Enhancing return/payoff profile, gaining capital protection or leverage

3. **Offer other dimensions for trading: 1) Volatility, 2) Correlation, 3) Path-dependent**

4. **Provide more flexibility and more choices to investors.**

5. **Investor has direct input in product design decision. Feeling of “in more control”.**
   - ✓ Once transacted, investment is in “auto-pilot” mode.

6. **Resolve regulatory and market access restrictions.**
   - ✓ Credit constraint in dealing with OTC derivatives
   - ✓ Allow market access to restricted markets, e.g. Participation Notes/Certificates

3. Uses and Benefits of Using Structured Products

Benefits

Benefits derived from investing in structured products include:

1. **Enhancing potential return** from domestic and international markets or protecting against market price volatility;
2. **Deferring, avoiding or reducing** transactions costs, income taxes or management fees associated with buying and selling other type of securities;
3. Obtaining returns from potentially **higher yielding** and otherwise **unavailable investments** by combining elements of different asset classes into hybrid instruments;
4. **Limiting, reducing and virtually eliminating downside exposure** to price fluctuations in cash investments;
5. Participating in the **returns of international markets** with less cash exposure;
6. **Diversifying** into international markets, reducing exchange rate exposure or minimising regulatory risks; and
7. Investing in internationally linked structured instruments that trade in the investor's home market during **normal trading hours** rather than trading hours in other time zones.

3. Uses and Benefits of Using Structured Products

Uses

Fixed Term Maturity

- Like both debt securities and options, structured products normally have **fixed maturities / expiration dates**, at which they are redeemed.
- Time horizon: Few days → 1 year (average)

Principal Protection

- Principal-protected structured products offer **principal sum protection at maturity** with the potential for additional return based on -> performance of underlying

Yield Enhancement

- For more risk tolerant investors
- Forfeit partial or full principal protection at maturity for potential of higher return

Diversification and Accessibility

- Offer investors exposure to markets or strategies that are not conveniently accessible directly by investors, such as currencies and commodities

Leverage

- Most structured products utilize leverage
- Offer potential to receive leveraged returns on value of underlying reference

4. Uses and Benefits of Using Structured Products

Basic Product Types

1. **Capital Guaranteed or Principal Protected Products**
   - ✓ Redemption of full or a large portion of the initial capital is assured.
   - ✓ Investors typically buy options.
   - ✓ Risk-adverse, conservative investors who cannot afford to lose capital.

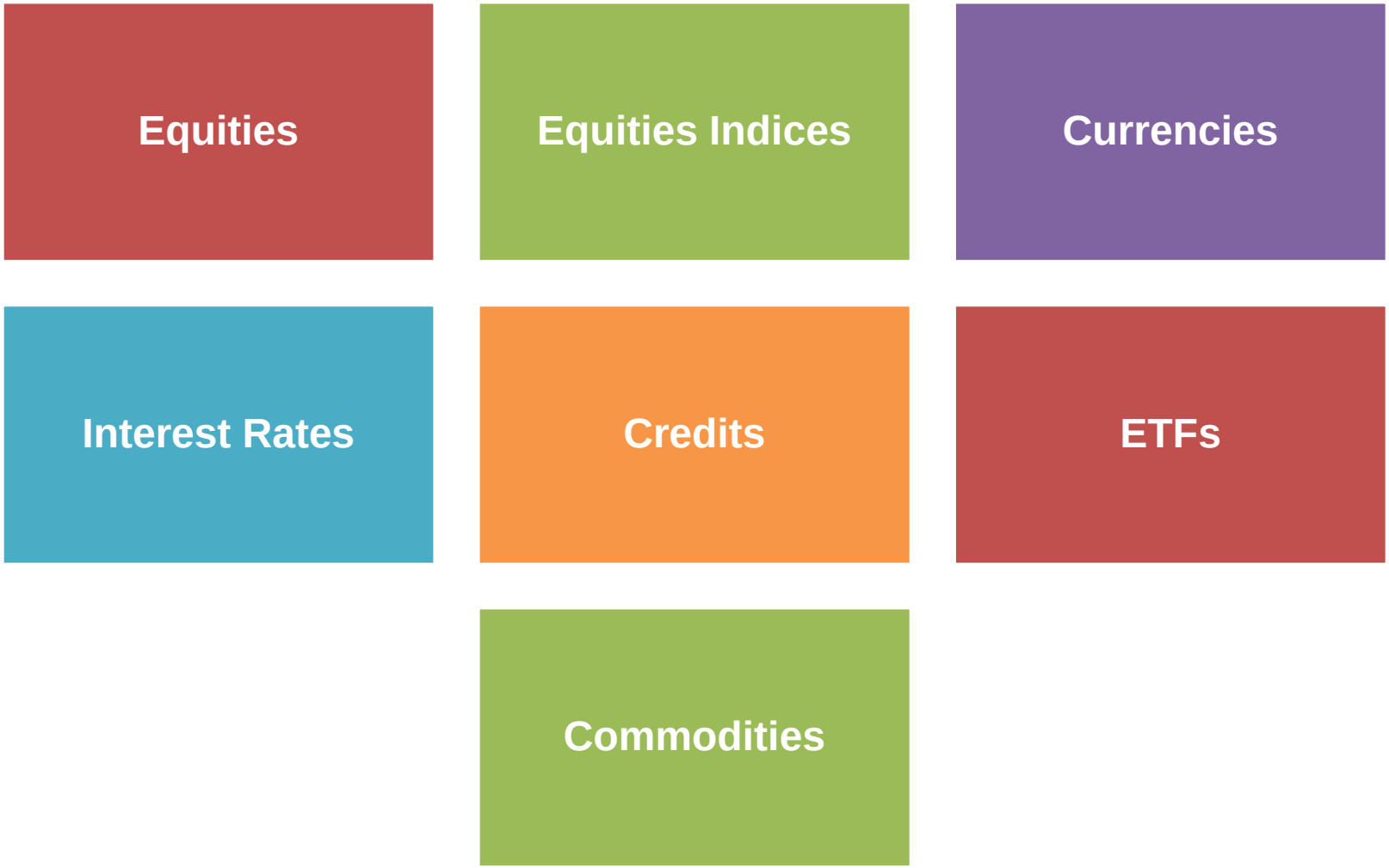
2. **Yield Enhancement Products**
   - ✓ Partial or full amount of initial capital is at risk.
   - ✓ Investors typically sell options.
   - ✓ Investors with high risk appetite and who desire higher income yield.

3. **Leveraged Products**
   - ✓ Participation on the underlying asset is leveraged up.
   - ✓ Investors typically buy options in leveraged amount.
   - ✓ Investors with very high risk appetite.

4. **Wrapper Products**
   - ✓ Designed to gain market access or participation.
   - ✓ Participation Notes (or Certificates)

5. Components of a Structured Product

Types of underlying references for structured products



6. Payout Structures of Structured Products

6 common payout structures

1. **Callable:**
   - An investment product which can **automatically mature ("auto-called")** prior to scheduled maturity date if certain predetermined market conditions are achieved.
   - "Auto-called" when price of underlying > predetermined trigger level ("auto-call barrier").
   - **Payout:**
     - When structured product is auto-called, investor receives predetermined payout + capital redemption on that auto-call date.
     - Coupon is proportional to length of time from start date to auto-call date.

2. **Range Accruals Payoff:**
   - When investor forecasts that the price of underlying will stay within predefined range
   - **Payout:**
     - Fixed payout whose amount depends on the **number of times** the performance of the underlying reference stays within a **certain range** during a specific period of time
     - Determined largely/entirely by embedded range accumulation option

3. **Averaging Values:**
   - Created using Average or Asian Options
   - **Payout:**
     - Determined by average underlying price over some pre-set period of time

6. Payout Structures of Structured Products

6 common payout structures (contd)

4. **Lookback:**
   - Allows investor to benef from favourable market timing for his synthetic operations of buying or selling the underlying.
   - **Payout:**
     - Linked to max/min price registered by underlying reference during observed period

5. **Cash or Nothing Payoff:**
   - **Payout:**
     - Pays set amount if the underlying reference is above, at or below a certain level on a specific date

6. **Quantity Adjusting – Quantos**
   - Underlying is denominated in one currency, but instrument itself is settled in another currency at some fixed rate.
   - Attractive for speculators and investors who wish to have exposure to a foreign asset, but without corresponding exchange rate risk

7. Structured Products – Examples

Example 1: Capital-Protected Structure

Example 1: Capital-Protected Structure

PRODUCT NAME: Index-linked Capital-Protected

UNDERLYING INDEX: KLCI Index

MATURITY: 3 years

PRINCIPAL AMOUNT: RM 1,000,000

ISSUE PRICE: 100%

COUPON: 0%

INDEX PARTICIPATION RATE (G): 60% ✓

CAPITAL GUARANTEE RATIO: 100% ✓

SETTLEMENT METHOD: Cash settled

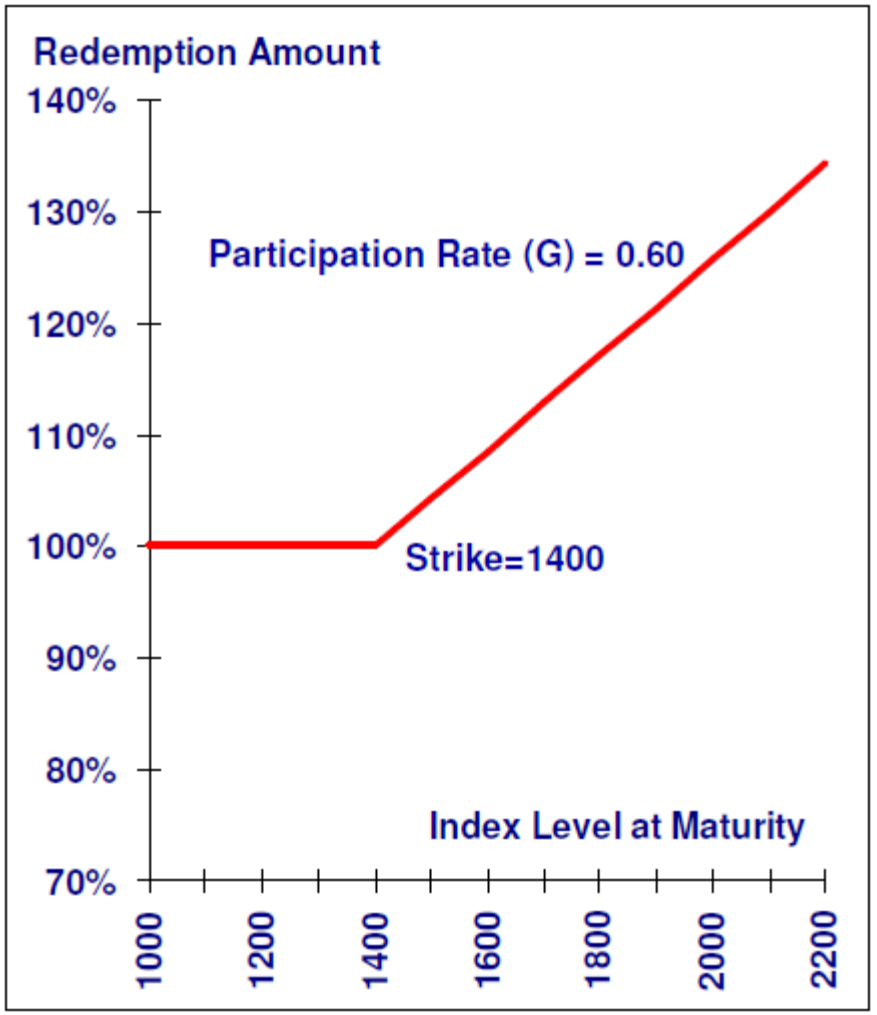
REDEMPTION AMOUNT (R):

$$R = 100\% + (IPR \times G) \times 100\% \geq 100\%$$

IPR: Percentage Rise of Index over Maturity.

Assume Index Level on Start Date = 1400

Capital protection is only assured at maturity!



7. Structured Products – Examples

Example 1: Capital-Protected Structure

Pros:

1. Initial capital is assured at maturity, i.e. 100% capital protection.
2. Upside participation in the selected stock index (market).
3. Out-performs bond/fixed deposit of similar tenure if stock market had performed well.
4. Similar to investing in a Balanced-type unit trust.

Cons:

1. Limited exposure to stock market. 60% Participation Rate in this example.
2. Underperforms stocks (e.g. index fund) if stock market had risen sharply.
3. In low interest rates environment, Participation Rates will be lower and tenure longer.
4. Investment capital is locked in over a long period.
5. “Passive” investment management.

7. Structured Products – Examples

Example 1: Capital-Protected Structure

Enhancing the Structure

a) Increasing the Participation Rate:

1. Capping the index upside; e.g. call spread
2. Setting a higher strike level (for call option)
3. Use of Asian-style (Averaging) options
4. Extending the tenure
5. Sell option(s) on other underlying assets and taking some risks
6. Use of Path-dependent Options, e.g. knock-out and knock-in options

b) Capturing and maximising the index upside:

1. Use of Path-dependent Options, e.g. Barrier Options
   - ✓ "Lock-in" feature to lock in when the index had reached a certain level
   - ✓ "Look-back" feature to lock in the highest level reached
2. Such features come with additional cost; resulting in a lower Participation Rate

7. Structured Products – Examples

Example 2: Bull Equity-Linked Structure

Example 2: Bull Equity-Linked Structure

PRODUCT NAME: Bull ELS or Reverse Convertible

UNDERLYING STOCK: **Sime Darby**

MATURITY: 35 days

ENTITLEMENT: 1 Bull ELS entitles 1 Share

REFERENCE PRICE: RM 11.80

ISSUE PRICE: **RM 11.107** ✓

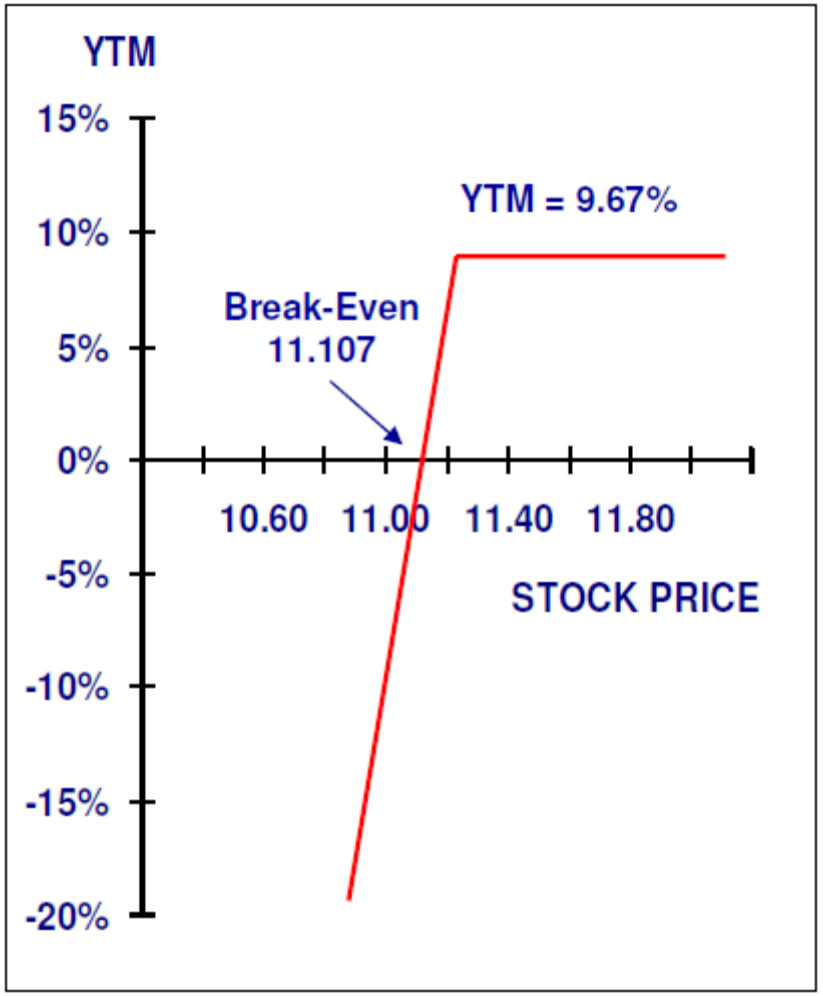
EXERCISE PRICE: **RM 11.210** ✓

YIELD-TO-MATURITY*: **9.67% p.a.**, if redeemed at RM11.21

REDEMPTION AMOUNT:

(A) At Maturity, if Share ≥ RM 11.210
Redemption= RM 11.210 (i.e. YTM=9.67%)

(B) Otherwise, 1 Bull ELS redeems for 1 Sime Share
Effective Share Purchase Price= RM 11.107



e.g. 3-month Bank Deposit: 3.0%

* YTM = { (11.210 − 11.107) / 11.107 } × (365 / 35) = 9.68%

7. Structured Products – Examples

Example 2: Bull Equity-Linked Structure

Pros:

1. Superior yield over bank's Fixed Deposit if market view had been correct.
2. "Target Buying" at below RM 11.21
   - ✓ Effective purchase of shares at RM 11.107 if view had been wrong.
   - ✓ Must be "happy" to buy or be "long" the shares at RM 11.107.
3. Enforces market/investing discipline, instead of trying to time the market. No leverage.

Cons:

1. Relatively more risky.
   - ✓ Suffers loss if share falls below RM 11.107 (break-even price).
   - ✓ Potential loss is unlimited.
2. Potential upside is limited. Maximum yield 9.67% p.a. (or 0.93% in absolute terms).
3. Unattractive Risk-Return profile. Investor takes substantial risk for a small 0.93% pick-up.
4. Investment is locked in for 35 days.
5. Requires full capital upfront. Cannot leverage.

7. Structured Products – Examples

Example 2: Bull Equity-Linked Structure

Enhancing the Structure

a) Achieving a higher yield:

1. Setting a higher exercise price (or strike).
2. Select stocks that are more volatile.
3. Extending the tenure.
4. Use “Worse-of” Put option
   - ✓ Addition of another risk factor (correlation) into the pricing.
   - ✓ Select stocks with higher negative correlation(s); higher option value.
   - ✓ Negative: Investor will have risk exposure to more than one stock.

8. Risks of Investing in Structured Products

9 common risks

8. Risks of Investing in Structured Products

9 common risks

1. **Credit risk:**
   - Structured products are **unsecured debt obligations of the issuer** and are therefore subject to risk of default by the issuer.
   - Structured products are generally **not covered by PIDM** unless it satisfies the criteria set under the Guidelines on Deposit Insurance Coverage for Deposits.

2. **Income risk:**
   - Structured products may not pay interest at all or may not pay interest in regular amounts or at regular intervals, so they are not appropriate for investors looking for constant income.
   - Return is tied to the performance of the underlying reference(s).

3. **Pay-out structure risk:**
   - **Possible structures:**
     - **Caps:** maximum return limits
     - **Barriers:** May not offer any return if barrier is broken or breached during the term
     - **Participation rates:** Participation rates <100% = investors realise return <return on underlying reference.

8. Risks of Investing in Structured Products

9 common risks (cont'd)

4. **Market Risk:**
   - Risk of movements in market prices or rates adversely affecting value of the underlying reference.
   - Factors that can affect the performance of the option embedded in structured products include volatility, dividends (if any), and interest rates.

5. **Liquidity Risk:**
   - Relative lack of liquidity due to the highly customised nature of the investment – since payout profile valid only at the end of the term.
   - Not listed and traded on the stock exchange, or traded on the derivatives exchange in Malaysia.

6. **Currency risk:**
   - Present when 1) principal amount or 2) returns of structured product are denominated in a different currency.
   - Currency fluctuations may have indirect effects on the movements of the underlying reference index or related market factors.

8. Risks of Investing in Structured Products

9 common risks (cont'd)

7. **Option risk:**
   - Structured products normally have embedded derivatives such as options which are affected by market factors (eg movements in the underlying reference index, volatility of index, profit rate levels, dividend levels, foreign exchange rates etc)
   - Options by their nature is also subject to time decay (decline in value over time).

8. **Call risk:**
   - Structured products may include a provision that allows the issuer to retire or 'call' all or part of issue before maturity. This creates **uncertainty for investors** as their cash flow may not be known with certainty.
   - Also includes reinvestment risk and lower capital appreciation potential for investment.

9. **Counterparty risk:**
   - Fulfilment of the contracts depends on the performance of other parties.

The End