TOPIC 4 - OVERVIEW

1. EQUITY SECURITIES

- The most common type of equity is a share, representing a share in the ownership of a company
- The owner of a share is entitled to **share the profits** of a company
- Details of the various types of equity securities follow

1.1 Ordinary Shares

- The most common type of share, a holder has **voting rights** and receives a share of company profits in the form of dividends
- On company liquidation, ordinary shareholders are entitled to a share of company assets, once all liabilities are settled
- To attract good quality and high growth companies to list in Hong Kong, innovative companies with a **weighted voting right (WVR)** structure are permitted to list on the Main Board, as long as they meet certain requirements from 30 April 2018. WVR shares are not permitted to confer more than ten times the voting power of ordinary shares

1.2 Preference Shares

- Entitled to receive dividends at a fixed rate, with priority over ordinary shares
- In the event of a liquidation, **preference shareholders rank ahead of ordinary shareholders** but after other creditors

1.3 Bonus Shares

- New shares issued to existing shareholders in proportion to their existing holdings at no cost
- Discussed earlier in Topic 2

1.4 Rights Shares

- A new share issue that is offered to existing shareholders
- The number of rights is pro-rated on the existing number of shares held – e.g. a 1 for 3 rights issue will provide one new share for every three shares currently held
- A rights issue subscription price will always be set **below the current market price**, providing existing shareholders with an incentive to subscribe

1.5 Stock Options

- The holder has a **right**, but **not the obligation**, to buy or sell the underlying asset at a future date at a predetermined price
- The underlying asset of a stock option is an **individual stock**
- Options can be closed out prior to expiry or settled with physical delivery of shares, at or before the maturity date
- Hong Kong exchange-traded stock options are "**American Style**", which means they can be exercised at any time up to and on date of expiry

1.5.1 Key Concepts

Call and Put Options

- A **call option** is the right to buy an underlying asset at a specified price (strike price) on or before a specified date (expiry date)
- A **put option** is the right to sell an underlying asset at a specified price (strike price) on or before a specified date (expiry date)
- Taking up the right is known as **exercising the option**
- The seller (writer) of an option has an **obligation** to sell/buy when the option is exercised by the buyer (holder)
- Unlike futures and forwards, the buyer of an option has **no obligation** to sell or buy the underlying asset, but will exercise if it is profitable to do so
- The price paid to purchase an option is known as the **option premium** and is paid to the option seller
- Examples of **exchange-traded options** are: options on shares; options on indices; and options on futures

- **Value of an option = intrinsic value + time value**

Value of a Call Option: Example
A call option on the shares of Examinator Online has a strike price of HK$25. If the call option is priced at HK$7.50 per option, what is the intrinsic and time values of the option if the spot price of Examinator Online is:

- *HK$28 per share*
- *HK$22 per share*

Answer
HK$28 per share
Option value = intrinsic value + time value

HK$7.50 = HK$3 + time value

Time value = HK$4.50

HK$22 per share
Option value = intrinsic value + time value

HK$7.50 = HK$0 + time value

Time value = HK$7.50

Value of a Put Option: Example
A put option on the shares of Examinator Online has a strike price of HK$88. If the put option is priced at HK$28.50 per option, what is the intrinsic and time values of the option if the spot price of Examinator Online is:

- *HK$68 per share*
- *HK$100 per share*

Answer
HK$68 per share
Option value = intrinsic value + time value

HK$28.50 = HK$20 + HK$8.50

Time value = HK$8.50

HK$100 per share
Option value = intrinsic value + time value

HK$28.50 = HK$0 + time value

Time value = HK$28.50

- For both call and put options:

	Action
Intrinsic value = 0	Do not exercise
Intrinsic value > 0	Exercise

- **Call option holders** benefit from an upward price movement in the stock
- **Put option holders** benefit from a downward price movement in the stock

The Option Writer

- The **seller** of an option is known as the writer of an option
- Selling an option allows the writer to earn a **premium income,** however if the writer's view of the market proves to be incorrect, money will be lost if the total loss exceeds the option premium earned
- The call option writer expects the price of the underlying share to fall or remain steady
- The put option writer expects the price of the underlying share to rise or remain steady

Exercise Style – American or European

- An **American** option can be exercised at any time from the date of purchase until it expires
- A **European** option can only be exercised on the day of expiry

Moneyness

	Call Option		Put Option	
	Intrinsic Value	**Moneyness**	**Intrinsic Value**	**Moneyness**
Spot < Strike	0	Out-of-the-money	>0	In-the-money
Spot = Strike	0	At-the-money	0	At-the-money
Spot > Strike	>0	In-the-money	0	Out-of-the-money

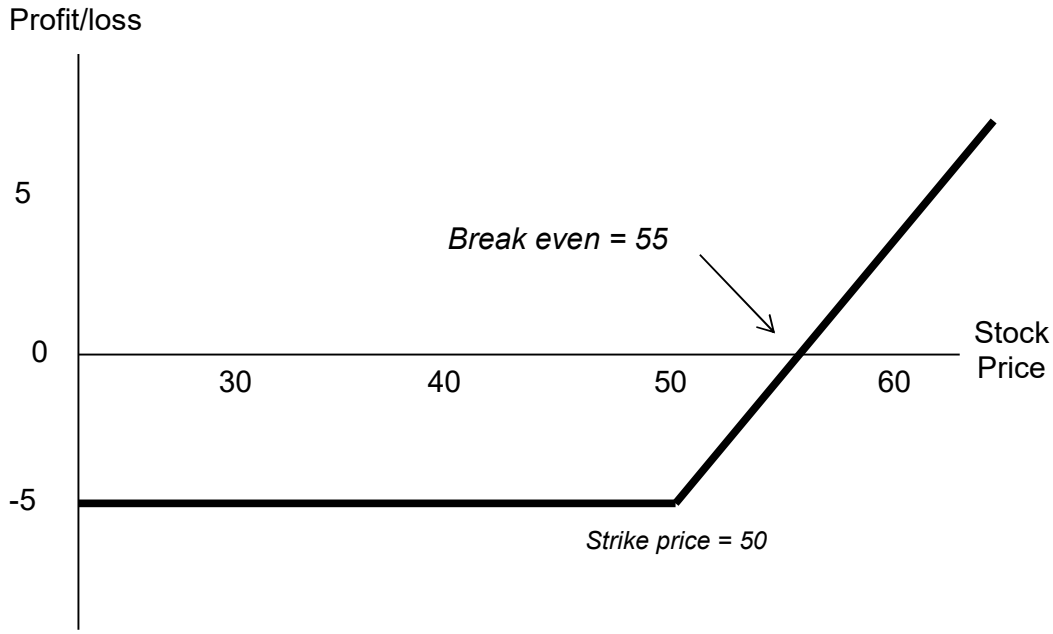
Option Premium

- Value or price of an option
- Sum of intrinsic and time values

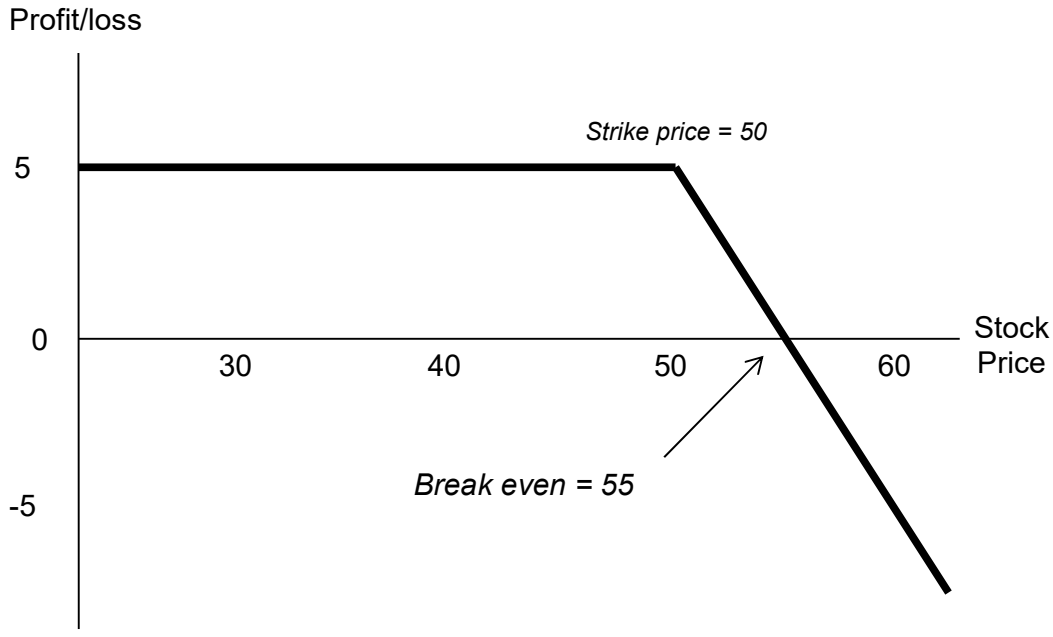
1.5.2 Pay-off Diagram

- Shows the potential profit or loss depending upon the movement of the price of the underlying stock
- In all **four diagrams that follow**, the option premium is HK$5 and the strike price is HK$50

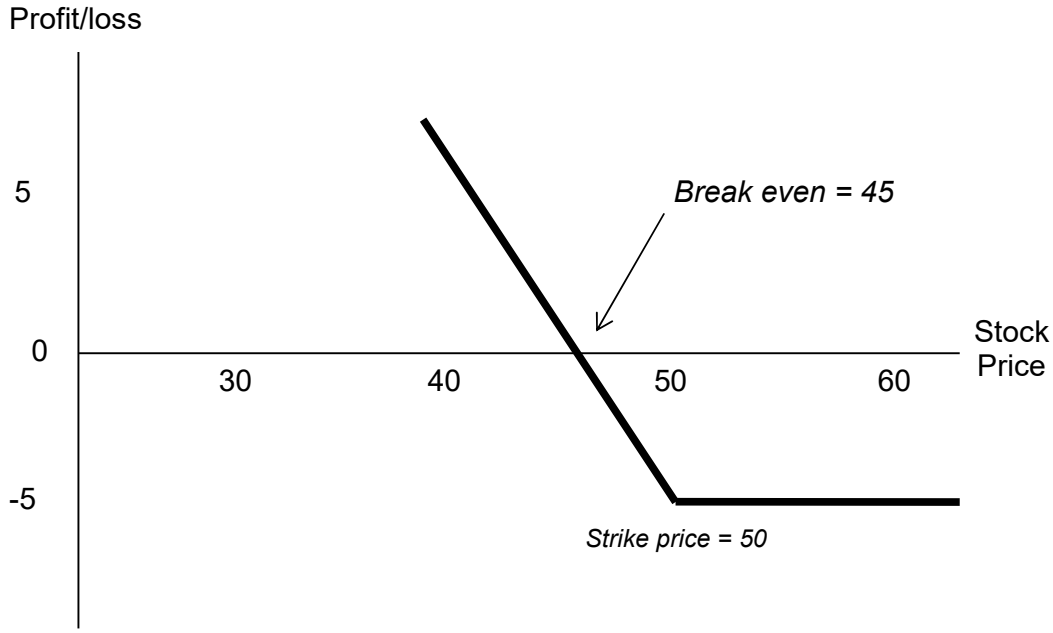
Long Call



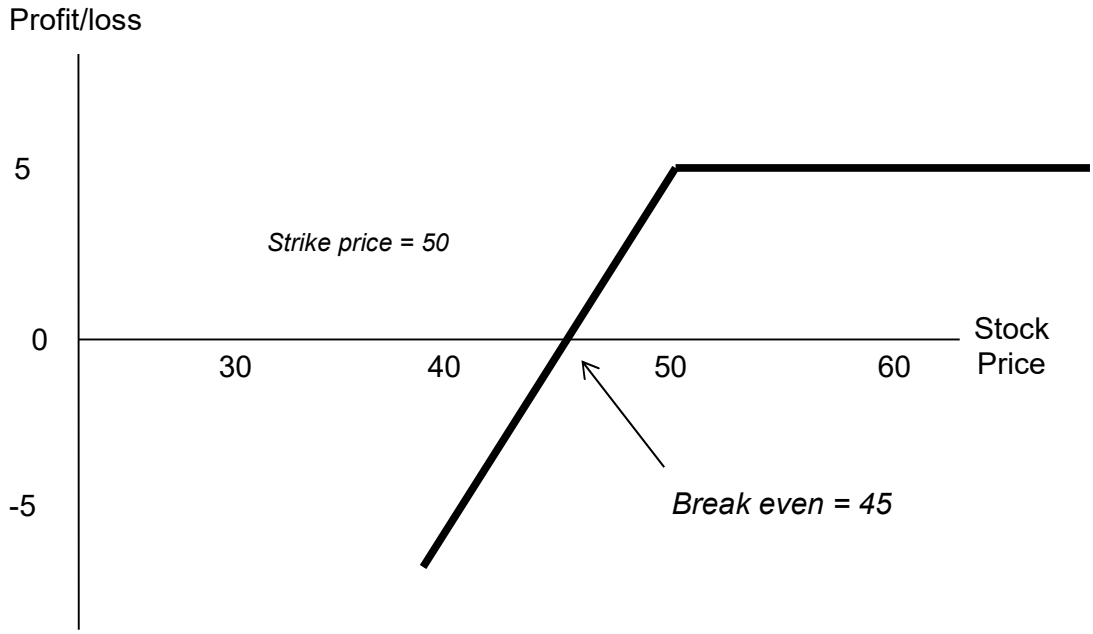
Short Call



Long Put



Short Put



1.6 Warrants

- The first **equity warrants** in Hong Kong were issued in the 1980s
- In 1989, the first **derivative warrant** was issues in Hong Kong and became the prevalent product
- Like options, warrants give an investor exposure to the underlying securities without owning the securities and they will expire at a certain time in the future
- While **both warrants and options are traded on the Stock Exchange of Hong**, warrants are matched using the **Orion Trading Platform (OTP-C)** and cleared through **CCASS**, and options are matched using **HKATS** and cleared through **DCASS**
- Warrants **cannot** be sold short

1.6.1 Types of Warrants

- There are two broad types of warrants traded on the SEHK: equity warrants and derivative warrants

Equity Warrants

- Equity warrants (also called company warrants) carry the right to subscribe for the underlying stock of the issuer
- Although warrants are less certain, as to the funds raised in the future, than rights issues, there will in general be no immediate dilution effect to shareholdings before the warrants are exercised
- Holders are not entitled to dividends
- The following are advantages in issuing warrants for the underlying companies:
  - New capital is raised when the warrants are exercised
  - Relatively inexpensive to issue
  - Traded on SEHK, providing a liquid secondary market for warrant holders
  - Can be used as “sweeteners” when issuing bonds or with IPOs or as an additional bonus in good years
  - Can replace cash dividends in poor cash-flow years
  - Shareholder base can be broadened when warrants are exercised

Derivative Warrants

- Derivative warrants (also called covered warrants) are similar to equity warrants but are issued by a party that is independent of the issuer of the underlying securities of the company and its subsidiaries
- Majority in Hong Kong are settled in cash
- Can be call or put warrants
- May be issued over assets other than securities (such as currencies or commodities)
- Index warrants, basket warrants and single stock warrants are commonly issued in Hong Kong

1.6.2 Key Concepts

Call and Put Warrants

- A call warrant gives the holder the right, but not the obligation, to buy the underlying stock at a predetermined price at some time in the future
- A put warrant gives the holder the right, but not the obligation, to sell the underlying stock at a predetermined price at some time in the future
- Call warrant holders benefit from an upward price movement in the underlying asset, whereas put warrant holders benefit from a downward trend

Warrant Price

- The price of a warrant can be influenced by the following factors
  - Price of the underlying instrument
  - Exercise price
  - Time to expiry
  - Volatility
  - Interest rates
  - Dividends
- See option pricing covered below (section 13) to understand how the above factors influence price

Expiry Date

- The final date on which a warrant can be exercised

Underlying Instrument

- The value of a warrant is derived from the price of the underlying instrument
- Some warrants are priced over a basket or portfolio of shares

Exercise Style – American or European

- **American** style warrants can be exercised at any time, on or before the expiry date
- **European** style warrants may only be exercised on maturity of the warrant
- In Hong Kong, **derivative warrants** are always European style, while **equity warrants** are usually American style

Exercise Price

- The strike price that must be paid when a warrant is exercised to ensure transfer of the underlying instrument

Conversion Ratio

- This is the number of warrants that must be exercised to convert into one unit of the underlying stock
- For example, if the conversion ratio was 10-to-1, ten warrants must be exercised to obtain one unit of the underlying asset

1.6.3 Advantages of Warrants

- While warrants are high-risk investments, they come with the following fundamental advantages:

Gearing

- An investor can obtain exposure to the underlying securities for only a fraction of the amount needed to purchase the actual securities

Hedging

- Warrants can be used to hedge investment positions in the same way that options can, although warrants tend to allow a longer-term hedge

Speculation

- A relatively cheap way of speculating on the movement of stock prices

Market Exposure

- Index or basket warrants can give an investor exposure to the market or a particular market sector without the investor having to own a large portfolio

Capital Raising

- When an equity warrant is exercised, the company issues new shares and new funds are raised

Improving the Liquidity of the Underlying Stock

- Liquidity of the underlying stock can be enhanced when derivative warrant issuers need to buy the underlying shares to hedge their positions

1.6.4 Risks of Warrants

Liquidity Risk

- This is the risk that an investor may not be able to readily buy or sell warrants on the market – occurs with deeply out-of-the-money warrants
- Since 2002, issuers of derivative warrants are required to appoint Liquidity Providers (LP)
- For each warrant issue, there can only be one LP, whose duties include:
  - Providing continuous quotes or quote requests from five minutes after the market has opened until the market closes
  - Providing liquidity for at least 10 board lots of a warrant
  - Specifying the maximum spread between bid and offer prices in the listing document
  - Specifying in the listing document the response time for each quote request

Leverage Risk

- The percentage loss will be magnified if the underlying asset price moves in the wrong direction

Limited Life

- Warrants have an expiry date and may expire worthless

Corporate Decisions

- Unlike shareholders, warrant holders do not have voting rights and cannot influence management as regards corporate decisions that may affect share value

Other Risks

- Other risk factors include interest rates, inflation and the economic environment

1.7 Stapled Securities

- Generally refers to an arrangement where two or more different securities of the same issuer are listed as if they are legally bound together and cannot be transferred or traded separately
- There will be a single SEHK price quotation for a stapled security and no price quotation will be given for the individual components
- An example would be a company share combined with a unit in a trust

2. MARGIN FINANCING

- An investor borrows money to purchase securities, and uses those securities as collateral against the loan
- The acquisition of securities can be at a fraction of the cost, but profits or losses are realized on the full value of the securities
- Brokers usually re-pledge securities in margin accounts to other financial institutions to obtain funding for the investors, charging the investors interest
- Brokers need to obtain client authorisation to re-pledge securities
- A margin ratio of 70% means the investor has to pay 30% of the cost while borrowing the remaining 70% from the margin financier

Margin Financing: Example
Ivan Investor is to buy 40,000 shares of Gearupco at HK$100 per share and his broker is willing to offer an 80% margin on the company's shares. If Ivan takes the full margin financing, calculate the following, assuming no interest expenses nor other charges.

i. Minimum amount that Ivan has to pay to buy the shares
ii. Maximum amount of funds that Ivan can borrow from his broker
iii. Ivan's return on investment if Ivan sells the shares at HK$120 per share
iv. Ivan's return on investment if Ivan sells the shares at HK$88 per share

Answer

i. Minimum payment = 40,000 shares x HK$100 x 20%
= HK$800,000

ii. Maximum borrowing = 40,000 shares x HK$100 x 80%
= HK$3,200,000

iii. Return on investment = [(HK$120 - HK$100) x 40,000]/800,000
= 100%

iv. Return on investment = [(HK$88 - HK$100) x 40,000]/800,000
= -60%

2.1 Benefits and Risks of Margin Financing

2.1.1 Benefits of Margin Financing

- **Leverage effect**: broker financing provides leverage which magnifies the return on investment
- **Enhancing market liquidity**: funding increases the purchasing power of investors which increases market liquidity

2.1.2 Risks of Margin Financing

- **Leverage effect:** margin financing can also magnify a downside loss if a share price falls
- **Margin calls:** if an investor's equity falls below that required due to a fall in share price, a margin call is made requiring the investor to contribute more cash or securities to bring the equity back to the agreed minimum
- **Pooling risk**: if a broker re-pledges client securities collateral to a lender and then gets into financial difficulties, there is a risk that the lender may liquidate the re-pledged securities

3. STOCK BORROWING AND LENDING

- Mostly carried out among institutions, the lender is paid a fee by the borrower
- Borrower provides a substitution stock as collateral
- Borrowing securities is a common way of covering short sales in compliance with the SFO. If an institution sells securities which it does not own and buys them back on the same day, it has breached the SFO due to naked short selling

4. UNIT TRUSTS AND MUTUAL FUNDS

- A pooling of investors' funds or contributions which are invested in a portfolio of assets such as equities, bonds or currencies
- **Unit trusts** are managed funds with a trustee holding the assets on behalf of, and for the benefit of, the beneficiaries
- **Mutual funds** have a different legal structure to unit trusts. While a unit trust is a trust, a mutual fund is established as a company

Unit Trusts vs Mutual Funds

	Unit Trusts	Mutual Funds
Form of establishment	Trust	Limited liability company
Beneficiary	Unit-holders	Shareholders
Governing law	Trustee law	Companies law
Legal document in which the rules are detailed	Trust deed	Company's articles/bye laws and custodian agreement
Who protects investor interests	Trustee	Custodian
Who owns or holds the fund assets	Trustee for the benefit of the investors	Mutual fund company
Who is liable	Trustee	Company has limited liability; directors can be liable

Source: Hong Kong Investment Funds Association

- **Benefits** of investing in a unit trust/mutual fund include:
  - Professional management and low custody costs
  - Access to global investment opportunities
  - Diversification
  - Tax advantages and simple maintenance
- **Disadvantages** of investing in a unit trust/mutual fund include:
  - Long-term investment vehicles
  - Lack of investor control
  - Ongoing management fees

5. PILOT PROGRAMME SECURITIES

- In 2000, a pilot programme for trading US securities was introduced to the Hong Kong stock market
- The main characteristics of the securities in the pilot programme are:
  - Listed on NASDAQ or NYSE Amex
  - May include a number of exchange traded funds (ETFs)
  - No Hong Kong public offering
  - Not regulated as listings on SEHK's Main Board or GEM
  - Admitted on SEHK for trading only
  - Traded under Hong Kong laws and SEHK rules
- Examples of pilot programme shares are: Cisco Systems/Dell/Intel/Microsoft

6. EXCHANGE-TRADED FUNDS (ETFs)

- ETFs are designed to track the performance of a benchmark, such as the Hang Seng Index
- Investors gain exposure to the whole equity market for a relatively small investment
- The major Hong Kong ETF is the Tracker Fund of Hong Kong
- ETFs are traded on the SEHK in the same way as shares
- Supply and demand for a particular ETF can sometimes result in the market price being at a discount or premium to the fund's net asset value
- ETFs pay dividends in the same way as ordinary shares
- While traditional ETFs are passively managed, HKEx started to list active ETFs in June 2019. Active ETFs attempt to outperform market indices

6.1 Leveraged and Inverse Products

- **Leveraged products** aim to deliver a daily return equivalent to a multiple of the underlying index return that they track
- **Inverse products** aim to deliver the opposite of the daily return of the underlying index that they track

- In Hong Kong, leveraged and inverse products structured as ETFs, are authorised by the SFC as Collective Investment Schemes and traded on the SEHK
- The following caps are set at the initial stage on the leverage factors:
  - **Leveraged products**: a maximum leverage factor of two times (2x)
  - **Inverse products**: a maximum leverage factor of one time (ie inverse products cannot be leveraged)

7. REAL ESTATE INVESTMENT TRUSTS (REITs)

- A fund that invests in a portfolio of income-generating real estate properties
- Properties may include car parks, shopping malls, offices and serviced apartments
- A majority of income is distributed by way of dividends
- REITs are bought and sold on major exchanges like regular stock

8. DEPOSITORY/DEPOSITARY RECEIPTS (DRs)

- DRs are certificates issued by a depository bank, representing foreign shares held by the bank
- DRs carry the same risks as the underlying foreign share (ie currency, political and economic)
- **American depository receipts (ADRs)** are negotiable securities issued to investors in the US and can be traded without delivery of the underlying stock. ADRs are virtually equivalent to holding the underlying stock – examples are: HSBC Holding; China Mobile and CNOOC Limited
- **Global depository receipts (GDRs)** are similar to ADRs in principle, however they are issued to investors in more than one country. Denominated in US dollars
- ADRs and GDRs provide access to US and other foreign investors – it is easier/cheaper to list ADRs and GDRs than formal listing on a foreign market
- **European depository receipts (EDRs)** have been introduced denominated in Euros
- Hong Kong deposit**ary** receipts (**HDRs**) were one of the initiatives of the HKEx Strategic Plan 2007-09
- HDRs are similar to other DRs providing local investors with an opportunity to invest in overseas stocks, thus providing further portfolio diversification
- HDRs are traded, settled and pay dividends in HK dollars – the depositary takes care of currency conversion, delivery of corporate information and details of corporate actions

9. SHORT-TERM DEBT INSTRUMENTS

- While the Hong Kong debt market is not as well developed as the equity market, the short-term money market is well established
- Short-term debt instruments consist of securities with maturities of up to 1 year

9.1 Interbank Lending Market

- Short-term loans are issued among financial institutions such as banks and deposit-taking companies
- Loans can be issued in any currency for periods ranging from overnight to 12 months
- Loan interest rates are based on Hong Kong Interbank Offered Rate (HIBOR). Changes in the supply of funds will affect the level of HIBOR

9.2 Banker's Acceptance

- A short-term credit note issued by a non-financial firm and guaranteed by a bank
- Considered low risk and therefore carries a low interest rate
- The holder can hold until maturity or can sell it on the secondary market
- Priced on a **discount basis**
- Popular investment vehicle for money market funds and commonly used in international transactions

9.3 Commercial Paper

- A short-term unsecured promissory note issued by large corporations to finance working capital
- Interest rates usually higher than other money markets as notes are unsecured
- Maturities range from 30 to 365 days
- Priced at a discount to face value
- Hong Kong's secondary market is virtually non-existent

9.4 Certificates of Deposit (CDs)

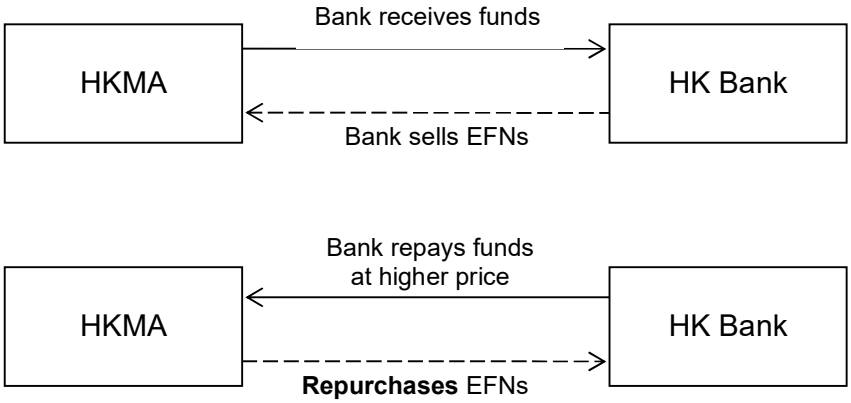
- Issued by banks indicating a deposit of a specified amount, for a specified period of time at a specified interest rate
- CDs can only be issued by Hong Kong authorized institutions, such as licensed banks – interest rates can be fixed or floating
- As they often bear the name of a respected bank, they are not usually difficult to sell
- A safer investment than commercial paper with a lower interest rate

9.5 Exchange Fund Bills

- Fixed income bills issued by the HKMA on behalf of the Hong Kong Government
- Maturities are 91-day, 182-day and 364-day
- Issued at a discount and by public tender
- Advantages include:
  - Low risk investment
  - Interest usually greater the bank deposit rates
  - Stable and predictable source of income
  - Highly liquid, tradable assets

9.6 Repurchase Agreements

- Widely used by central banks to relieve short-term shortages of funds in the money market
- Also known as "repo", it is a contract where the seller of securities agrees to buy them back at a specified time and price
- Allows the buyer to cover liquidity shortfalls



9.7 Pricing of Discounted Securities

- The majority of short-term securities are priced at a discount

$$P = \frac{FV}{1 + [r \times \frac{n}{365}]}$$

P	price (present value)
FV	face value of instrument
r	annual interest rate
n	number of days to maturity

Pricing Discounted Securities Example
A 90-day banker's acceptance has a face value of HK$100,000 with an interest rate of 5%. What is the current fair market price?

Answer
FV = 100,000 / [1 + (0.05 x (90/365)]
= 100,000/1.0123
= HK$98,785

10. LONG-TERM DEBT SECURITIES

- Debt securities with maturities of one year or more, usually referred to as bonds

10.1 Types of Bonds

- Bonds do not represent ownership of an entity, do not carry voting rights, but rank ahead of shareholders' claims on assets
- Less risky than equity, but provide lower returns

10.1.1 Government Bonds

- Given Hong Kong Government's regular budget surpluses, there has been little need to issue government debt
- However, in 1990, the Exchange Fund Bill and Note programme was introduced to develop a local debt market
- **Exchange Fund Notes (EFNs)** are the longer term equivalent of exchange fund bills (EFBs), providing investors with a low-risk investment tool. EFNs are now issued with two-year tenors only
- **Government bond programme** was introduced in 2009. From 2015, Government Bonds are for tenors of 3 years and above

10.1.2 Supranational Bonds

- Issued by **multilateral agencies** such as the World Bank and the Asian Development Bank
- Interest is exempt from HK profits tax

10.1.3 Corporate Bonds

- Issued by corporations, with primary issues dominating the market

10.1.4 Mortgage-backed Securities (MBS)

- Created when underlying mortgages are packaged or pooled by issuers for sale to investors
- The Hong Kong Mortgage Corporation Limited (HKMC) was created in 1997 and the first Hong Kong MBSs were issued in 1999

10.1.5 The Renminbi Debt Market in Hong Kong

- Hong Kong is fast becoming China's offshore financial hub for debt denominated in Renminbi (RMB), with AFIs in mainland China able to issue RMB debt in Hong Kong
- Issuers of RMB debt include sovereigns, mainland banks, Hong Kong, multinational corporations and international financial institutions

10.1.6 Mutual Debt Market

- Bond Connect is a mutual bond market access programme between Hong Kong and Mainland China established in July 2017
- Only Northbound trading is currently underway allowing overseas and Hong Kong investors to access the China Interbank Bond Market

10.2 Bond Pricing

- This section looks at the fundamental concepts of bond pricing

10.2.1 Expected Yield

- Expected annual return of the security and has an inverse relationship with price
- Yield can be linked with market interest rates

10.2.2 Coupon

- Coupon is the interest paid by a bond and is quoted as a percentage of face value
- A coupon can be annual, semi-annual, quarterly or monthly

10.2.3 Quoted Prices

- A **par value bond** is priced at face value
- A **discount bond** is priced at below face value
- A **premium bond** is priced above face value

10.2.4 Accrued Interest

- Accrued interest is interest accumulated but not yet paid
- If a bond is sold before a coupon day, the buyer has to pay the accrued interest, which the seller is entitled to
- Accrued interest is usually reflected in the bond market price

10.2.5 Clean and Dirty Prices

- The **clean price** of a bond excludes accrued interest
- The **dirty price** of a bond includes accrued interest

10.2.6 Calculating Bond Prices

- The current price of a bond is the present value of future coupon payments and the face value at maturity

Year	Cash Flow	Amount (HK$)	Discount Factor	PV of Cash Flow
1	Coupon	10	0.926	9.26
2	Coupon	10	0.857	8.57
3	Coupon	10	0.794	7.94
3	Principal	100	0.794	79.40
				105.17

$$P = \frac{10}{(1.08)^1} + \frac{10}{(1.08)^2} + \frac{10}{(1.08)^3} + \frac{100}{(1.08)^3}$$

$$= 9.26 \quad 8.57 \quad 7.94 \quad 79.4$$

$$= 105.17$$

10.2.7 Risk-free Rate

- The return of a risk-free asset is referred to as the risk-free rate
- US treasury notes and bonds are typical examples of risk-free assets
- The return of an asset over the risk-free rate is called the risk premium

Required rate of return = risk-free rate + risk premium

11. RISK MANAGEMENT FOR DEBT SECURITIES

- Debt market risk is principally the sensitivity of bond prices to a change in interest rates, measured by duration and convexity

11.1 Duration

- A measure of duration approximates to the percentage change in a bond price for a 1% change in interest rates
- Can also be thought of as the average number of years it takes for the discounted cash flow to be returned to the investor
- The **longer the time to maturity**, the **higher the duration**
- The **lower the yield**, the **higher the duration**
- The **lower the coupon rate**, the **higher the duration**
- Duration is commonly given as **Modified Duration,** which is **Macauley Duration** adusted for one yield measure

% change in bond price = - Duration x change in yield

Bond Duration Example
If a 5-year bond has a modified duration of 6 and is currently trading at HK$9,750, what approximate price will the bond move to if the bond yield increases by 1%?

Answer

% change in bond price	= -6 x 1%
	= -6%
New bond price	= HK$9,750 x (1 – 0.06)
	= HK$9,165

11.2 Convexity

- Convexity measures the change in duration with respect to changes in interest rates
- While duration is a linear measure, convexity takes the curvature of the price/yield curve into account

12. DERIVATIVES

- Instruments that derive their value from the values of underlying assets
- Details of basic financial derivatives follows

12.1 Futures

- An obligation or promise to buy or sell an underlying asset at a certain date and at a certain price
- Standardized contracts that are traded on an exchange

12.2 Forwards

- Similar to futures, but traded OTC and tailored to the needs of counterparties

12.3 Options

- Provides the holder with the right, not an obligation, to buy or sell the underlying asset, at a future date and at an agreed price
- Options can be exchange-traded or OTC

12.4 Swaps

- An OTC contract where two parties agree to exchange or swap a set of future cash flows
- The most common type is interest rate swaps where a fixed rate is swapped for a floating rate
- Swaps are used to lower cost of funds, increase returns, hedging and asset/liability management

12.5 Structured Products

- Exotic products formed by combining different types of basic derivatives
- Examples of structured products traded on the SEHK include Callable Bull/ Bear Bear Contracts (CBBCs) and Equity Linked Instruments (ELI)

12.5.1 Callable Bull/Bear Contracts (CBBCs)

- CBBCs track the price changes of underlying assets without needing investors to invest in those assets
- Issued as either bull or bear contracts by third parties other than the issuers of the underlying assets, usually investment banks
- A bull contract is an investment opportunity for investors who are bullish on the underlying assets
- A bear contract is an investment opportunity for investors who are bearish on the underlying assets
- A CBBC will be called by the issuer when the price of the underlying asset reaches the call price specified in the listing document
- When the CBBC is called or is a “knock out” or a “stop loss”, the trading of the CBBC on the SEHK is terminated immediately. It is referred to as a “mandatory call event”

12.5.2 Equity Linked Instrument (ELI)

- There are 3 different types of ELI listed on the SEHK**: bull, bear and range** for investors taking a bullish, bearish and neutral view respectively of the underlying security

12.5.3 Inline Warrant

- A type of structured product arranged by the HKEx, entitling investors to receive a specified amount at expiry conditional on one of two conditions:
  1. The price of an underlying asset falling within a specified range (in-the-range ITR)
  2. The price of an underlying asset falling outside a specified range (out-of-the-range OTR)
- Limited to a small number of HSI actively-traded stocks

13. FURTHER DISCUSSION OF STOCK OPTIONS

13.1 Factors Affecting Option Prices

- There are 6 major factors that affect the price of an option (option premium):
  - Spot price
  - Strike price
  - Interest rate
  - Volatility of underlying stock price
  - Time to expiry
  - Dividend

13.1.1 Spot Price

- The higher the spot price, the more in-the-money a call option will be, assuming the spot price is above the strike price
- The lower the spot price, the more in-the-money a put option will be, assuming the spot price is below the strike price

13.1.2 Strike Price

- The higher the strike price, the less in-the-money a call option will be, assuming the spot price is above the strike price
- The lower the strike price, the less in-the-money a put option will be, assuming the spot price is below the strike price

13.1.3 Interest Rate

- Instead of buying a security now, an investor can choose to buy a call option and then exercise, thereby buying the stock. In the interim, funds to buy the stock can be put on deposit, earning interest. The higher the interest rate, the more popular this strategy and the higher the call option price
- So, **call options increase in price when interest rates rise**
- Instead of selling a security now, an investor can choose to buy a put option and then exercise, thereby selling the stock. In the interim, funds required now would need to be borrowed, incurring interest. The higher the interest rate, the less popular this strategy and the lower the put option price
- So, **put options fall in price when interest rates rise**

13.1.4 Volatility of the Underlying Stock

- As the volatility of a stock price increases:
  - The probability of a call option increasing in value is higher
  - The probability of a put option increasing in value is higher
- So, **as the price volatility of an underlying security increases, so does the value of both call and put options**

13.1.5 Time to Expiration

- With **American-style options** (as with all SEHK traded stock options), the longer the time to expiration, the higher the value of the option (both call and put)
- With **European-style options** that have long times to expiration, the effect of the time to maturity is less certain than with American-style options

13.1.6 Dividend

- When a dividend is paid, the stock price will fall
- Accordingly, a dividend payment will lower the value of a stock's call option and increase the value of a stock's put option,

13.2 Risk Parameters

- The effect of the above factors on option prices can be measured by a set of risk parameters, described by Greek letters ("the Greeks")

13.2.1 Delta (∆)

- The delta of an option measures the **sensitivity of the option price to changes in the price of the underlying stock**

$$\Delta = \frac{\text{Dollar change in option price}}{\text{Dollar change in underlying stock price}}$$

- The delta value of a long call/short put is always between 0 and 1
- The delta value of a long put/short call is always between -1 and 0

Option	Delta Value		
	In-the-money	At-the-money	Out-of-the-money
Long call/short put	Up to 1	0.5	Down to 0
Long put/short call	Down to -1	-0.5	Up to 0

Delta Hedging Example
Charlie buys 1,000 shares of Pumping Limited at $200 per share. Charlie is interested in hedging his downside risk by using a put option. Currently, the put option has a delta of -0.5. If the put option contract has a lot size of 200 shares, how should Charlie hedge his risk?

Answer
Charlie's risk is that of making a loss if the stock price falls.

Using put options, Charlie should buy the options to hedge against downside risk. How many put option contracts should he buy?

$$\text{No. of put options needed} = \frac{\text{Total shares held}}{\text{Delta x option lot size}}$$

$$= \frac{1{,}000}{-0.5 \times 200}$$

$$= -10$$

If the share price drops by $1 to $199, Charlie will lose $1,000 on his investment. However a $1 fall in the share price will result in a $0.50 rise in the put option price (-$1 x- 0.5).

Therefore, Charlie will make the following gain on his put position:

$0.50 x 200 x 10 options = $1,000

The loss on shares is covered by the gain on put option contracts

13.2.2 Gamma (Γ)

- Gamma measures the rate of change in the option delta:

$$\Gamma = \frac{\text{Change in delta}}{\text{Dollar change in underlying stock price}}$$

- Gamma represents the **sensitivity of delta to underlying stock price changes**
- If gamma is low, delta changes slowly and little adjustment is required to keep the delta of a portfolio at the required level
- If gamma is large, delta is very sensitive to changes in the underlying stock price and frequent changes will be required to maintain a portfolio delta

13.2.3 Vega (v)

- Vega measures the change in option price for a 1% **change in volatility of the underlying stock price**

$$v = \frac{\text{Dollar change in option price}}{\text{1\% change in volatility of underlying stock price}}$$

3.2.4 Theta (θ)

- Theta measures the effect of the **passage of time** on the option price

$$\theta = \frac{\text{Dollar change in option price}}{\text{Decrease in time to expiration}}$$

- Theta is always negative, as option values always decrease as time passes

13.2.5 Rho (ρ)

- The Rho of an option measures the rate of change in the value of an option with respect to **changes in the risk-free interest rate**

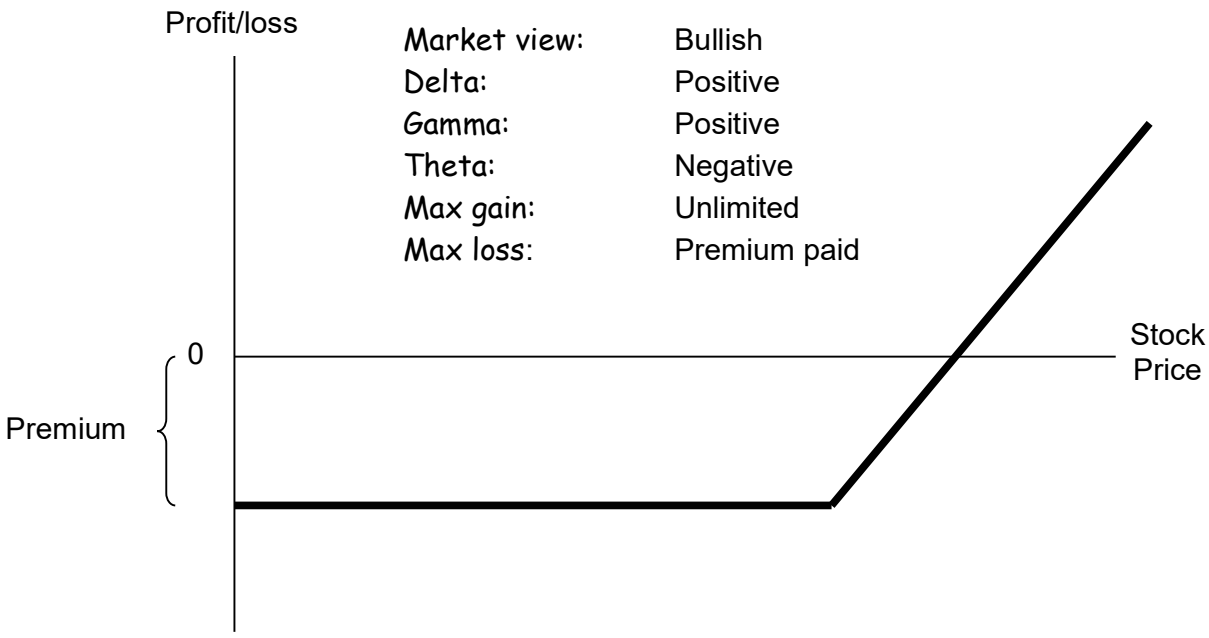
13.2.6 Risk Parameters of a Portfolio

- The risk parameter of a portfolio can be determined by adding up each individual parameter of each option, provided the options are based on the same underlying stock

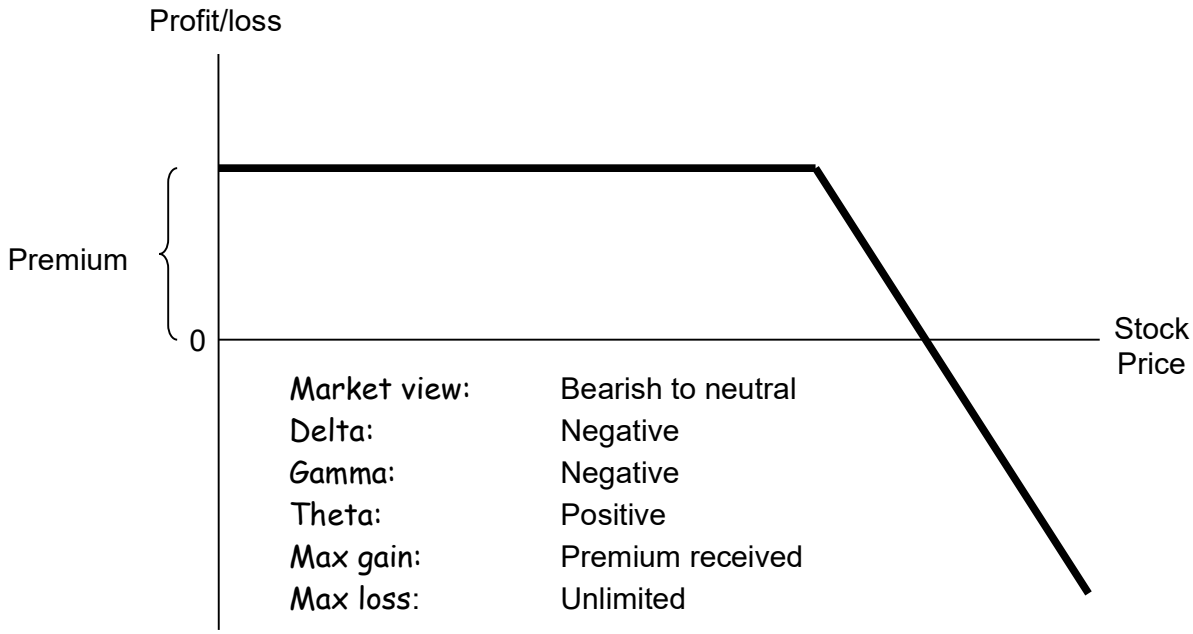
13.3 Basic Option Trading Strategies

- The four following sub-sections look at the use of options from the point of view of someone speculating on the direction of price movements

13.3.1 Long Call

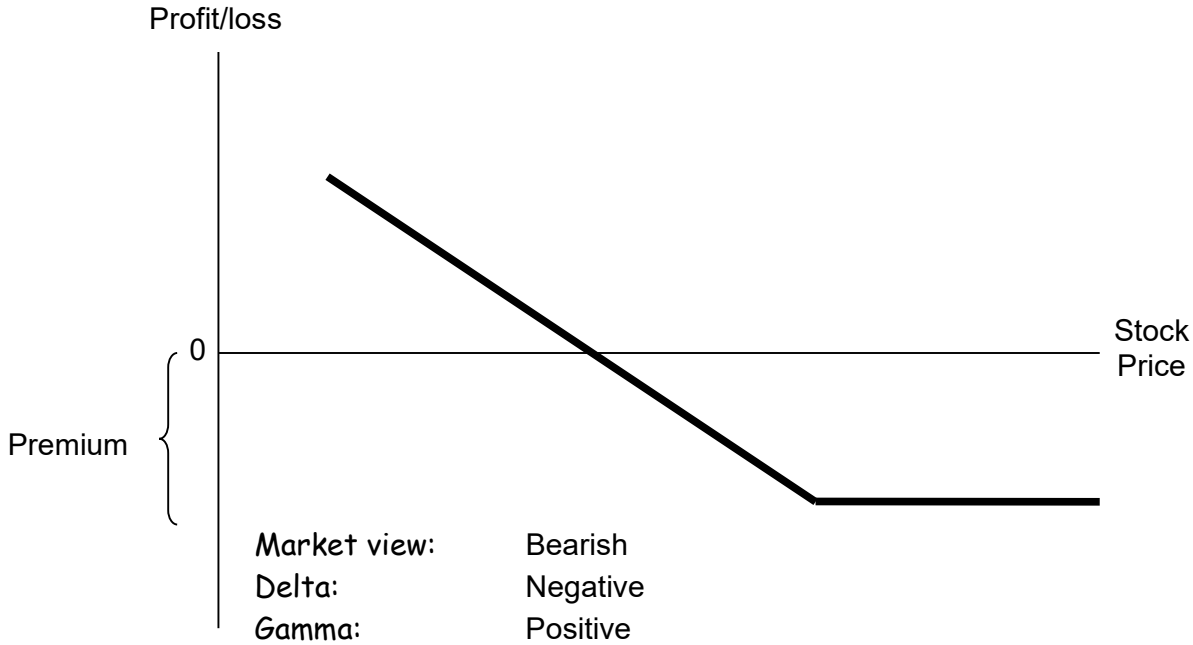


13.3.2 Short Call



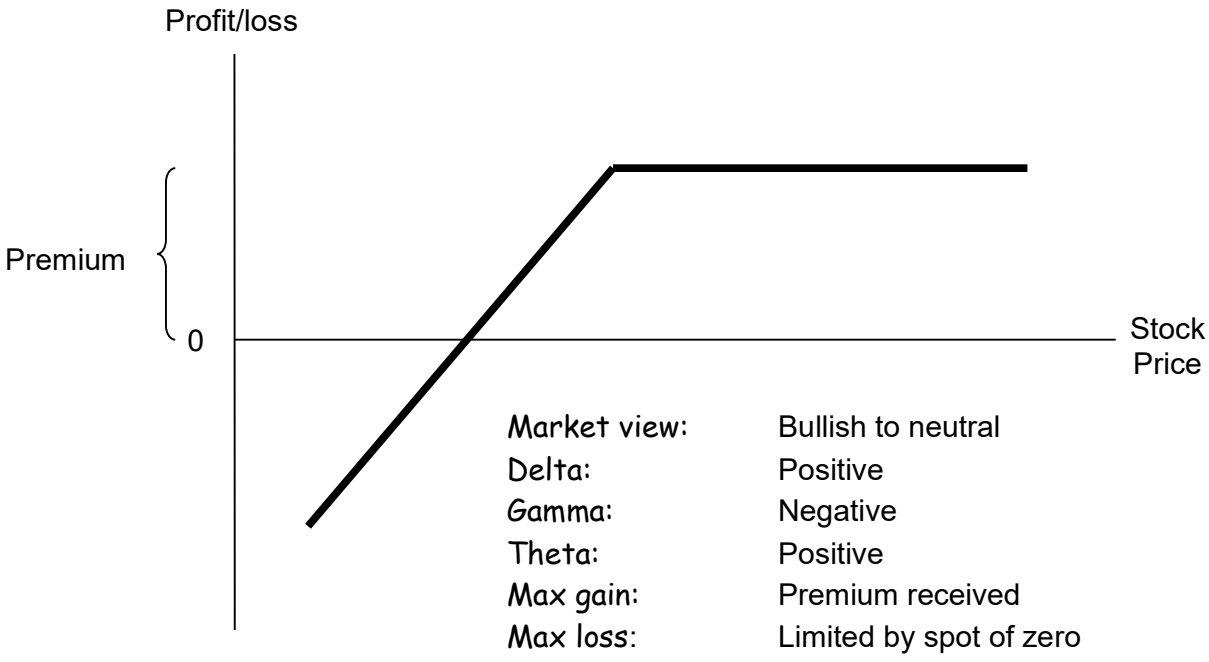
Market view:	Bearish to neutral
Delta:	Negative
Gamma:	Negative
Theta:	Positive
Max gain:	Premium received
Max loss:	Unlimited

13.3.3 Long Put



Market view:	Bearish
Delta:	Negative
Gamma:	Positive
Theta:	Negative
Max gain:	Limited by spot of zero
Max loss:	Premium paid

13.3.4 Short Put



13.3.5 Advanced and Synthetic Option Strategies

- An option strategy can be synthesized by combining the underlying stock and other options

13.4 Option Pricing

- The three most commonly used models to price options are:
  - Binomial option pricing model
  - Black-Scholes-Merton option pricing model
  - Simulation

13.4.1 Binomial Option Pricing Model

- Evaluates the option price by assuming that the underlying stock price follows a binomial random walk process

13.4.2 Black-Scholes-Merton Option Pricing Model

- Adopts an analytical approach by using an option-pricing formula

13.4.3 Simulation

- Involves using a computer to approximate the behaviour of the underlying stock and thus the value of the option, through a series of repeated random processes
- Monte Carlo simulation is a popular method