TOPIC 1 – OVERVIEW OF THE DERIVATIVES MARKET

1. FUNDAMENTALS OF DERIVATIVES MARKETS

1.1 What are Derivatives?

- "Derivative" is the term given to any financial instrument that **derives its value** from that of an underlying asset
- Underlying assets include:
  - Equity
  - Interest-rate products
  - Foreign currency products
  - Commodities
- There are **four basic types of derivatives**: futures, forwards, swaps and options
- Individual derivatives are considered "**plain vanilla**", whereas products displaying the characteristics of two or more derivative types are known as "**exotic**" products
- Derivative products are traded in two distinct markets:
  - Exchange-traded markets
  - Over-the-counter (OTC) markets

1.2 Exchange-Traded Derivatives

- In recent years, the global value of exchange-traded futures contracts has grown significantly. Three features of exchange-traded markets are:

- **Novation**
  - Once a completed trade is ready to be cleared and settled, the contract between the two parties is novated by the exchange
  - This means that the clearing house becomes the counterparty to the buyer and the counterparty to the seller
  - The clearing house buys from the seller and sells to the buyer, thereby guaranteeing settlement
  - Novation means that the buyer and the seller do not have to concern themselves with the creditworthiness of the other party – no counterparty or settlement risk

- **Centralised marketplace**
  - By offering standardised derivative products, an exchange provides a centralised marketplace for buyers and sellers to come together and trade
  - Liquidity and price discovery give confidence to both buyers and sellers that they are trading at the best possible prices

- **Standardised contract specifications**
  - All derivative products traded on exchanges have standardised contract specifications, including the quantity, price, expiry date and settlement date
  - Through standardisation, an exchange eliminates the contract terms risk for both buyers and sellers, so that there can be no dispute over the terms

1.3 Over-the-Counter Derivatives

- **Over-the-counter (OTC) derivatives** dominate the derivatives market, with much higher volumes than the exchange-traded market
- Unlike standardized exchange-traded derivatives, OTC derivatives are **tailor-made/customised** to the requirements of the counterparties
- The following table shows outstanding amounts globally in OTC derivatives markets by market risk category at December 2019:

Outstanding amount (USD trillions)	USD606.81
Market Risk Category	**%**
Interest rate	81.60
Foreign exchange	15.46
Equity-linked	1.06
Commodities	0.35
Credit-linked	1.49
Others	0.04

Source: Bank for International Settlements

- Trades conducted OTC do not generally include daily margining requirements, thereby freeing up capital and leaving both buyer and seller responsible for settling with the counterparty

Exchange-traded Derivatives

- Standardized features
- Traded on exchanges
- Exchange acts as counterparty between buyer & seller
- No credit (counterparty) risk

OTC Derivatives

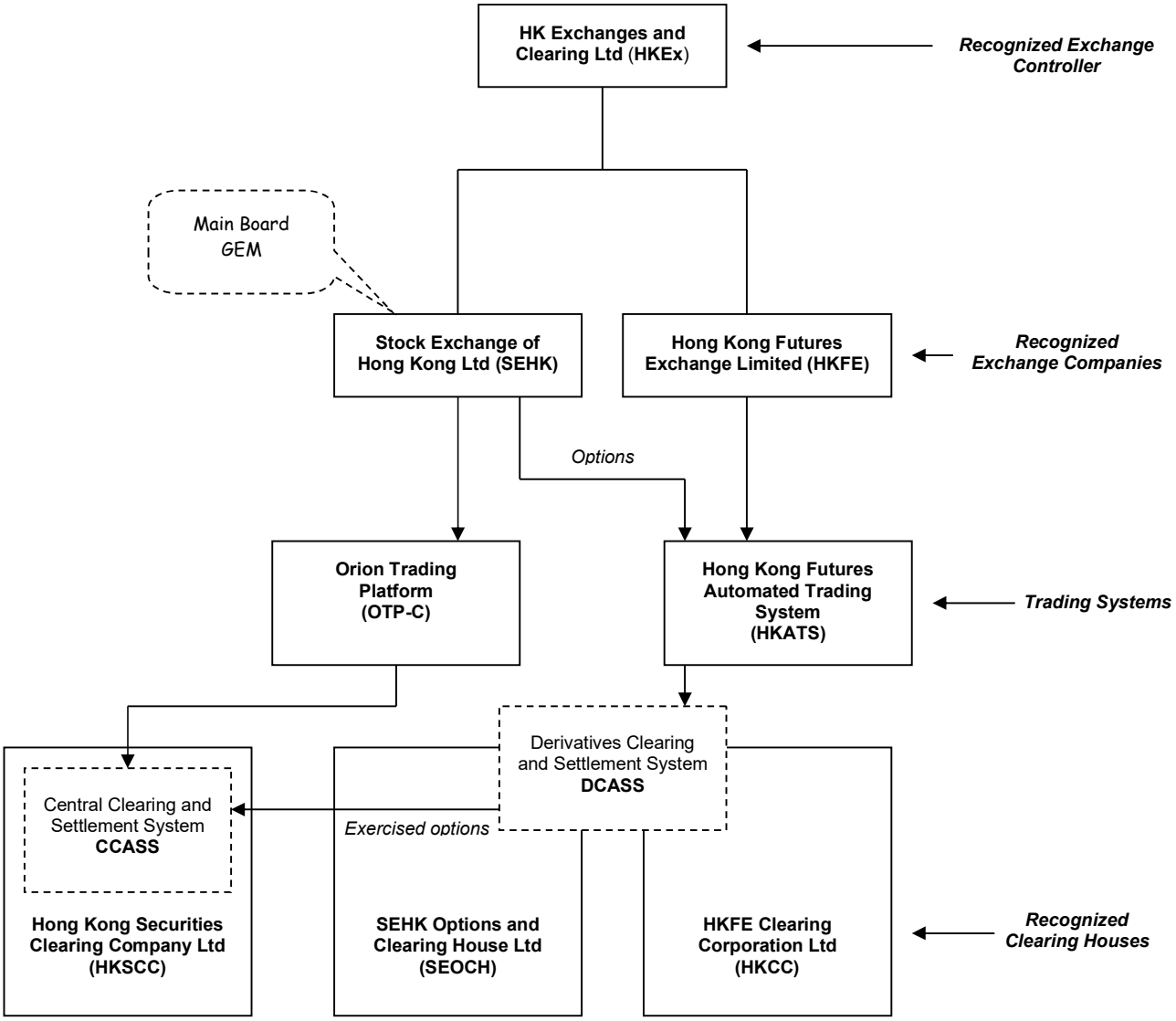
- Tailor-made features
- Set up by phone/email
- Direct contract between buyer and seller
- Credit (counterparty) risk

Central Counterparty for Over-the-Counter Derivative Products

- The collapse of Lehman Brothers in 2008 exposed serious faults regarding counterparty risk, leading to major systemic risk
- Leaders of major economies have agreed that OTC derivative products should now be cleared through central clearing houses

1.4 The Derivatives Market in Hong Kong

- Various derivative products are traded on Hong Kong Futures Exchange and The Stock Exchange of Hong Kong



- In November 2013, OTC Clearing Hong Kong Limited (**OTC Clear**) started operations. It was established to provide clearing services for over-the-counter (OTC) derivatives. It is 76% owned by HKEx with the remainder owned by 12 financial institutions, being the founding shareholders. The system processes trade registrations and novations, valuations, trade event management, and collateral and margin calculations
- On 31 August 2016, SFC designated OTC Clear as a central counterparty (CCP) for certain mandatory OTC derivative clearing obligations under the SFO
- Overall, the SFC has designated four local and overseas central clearing counterparties for OTC clearing: Chicago Mercantile Exchange, Japan Securities clearing Corporation, LCH.Clearnet and OTC Clearing Hong Kong

- Hong Kong has developed an actively-traded derivative warrants market since the mid-2000s
- Issuers of derivative warrants provide a critical mass of expertise in the market, which is able to develop a wide range of derivative warrants to meet the different risk appetites of different investors
- Callable Bull/Bear Contracts (CBBCs) are a type of structured product where investors do not need to pay the full asset price – they are traded on the cash market of HKEX

1.5 Overseas Derivatives Markets

- Some well-known exchanges and most actively traded futures contracts follow.

Chicago Mercantile Exchange CME): Eurodollar futures and currency futures

- **Eurodollar futures** are one of the most actively traded interest-rate futures in the global financial market – prices are determined by the market's expectation of the 3-month London Interbank Offered Rate (LIBOR)
- Eurodollar futures prices are derived by subtracting the implied interest rate from 100
- As the 3-month LIBOR is regarded as the benchmark for short-term borrowing of offshore US dollars, it has been widely used by financial and non-financial institutions for hedging and trading
- Eurodollar futures are also available on the **Singapore Exchange (SGX)** during Asian trading hours
- Options on Eurodollars are also available in CME
- Currency futures were first traded on 16 May 1972 in the International Money Market (IMM), which is now a division of CME

Intercontinental Exchange: Brent crude oil futures

- Brent crude oil futures are very actively traded energy futures and a very important tool for oil and airline companies for hedging purposes
- Quoted in US dollars per barrel, these are physically deliverable contracts with an option to cash settle against the ICE Brent Index price

Osaka Exchange: Nikkei 225 futures

- First introduced in Osaka in 1988, Nikkei 225 futures are the stock index futures for the Nikkei 225 Stock Average
- Widely used by fund managers who invest in Japanese companies to hedge their exposures

London Metal Exchange (LME): Copper futures

- LME is the world's largest trading floor for non-ferrous metals
- It offers futures and options contracts for aluminium, copper and other non-ferrous metals
- One of the most actively traded futures contracts, copper futures are quoted in US dollars per tonne
- Since 2014, London Metal Mini Futures have traded on the HKFE

Chicago Board of Trade (CBOT): Corn futures

- Corn futures are one of the most actively traded agricultural commodities on CBOT
- There are many uses for corn, including food for humans, feed for livestock and fuel
- Corn futures are quoted in US dollars per bushel

Various markets: Regional equity index futures

- Actively traded US index futures cover S&P 500 Index, Russell 2000 Index and Nasdaq Index
- **S&P 500 Index** represents the performance of blue chips in the US
- The **Russell 2000** is generally regarded as an index for small-capped firms
- The **Nasdaq Index** is for technology firms
- Actively-traded equity index futures in Europe include **DAX futures** (German stocks), **DJ EURO STOXX 50 Index** Futures (major European stocks) and **FTSE 100 Index Futures** (UK stocks)

2. TYPES OF DERIVATIVES

2.1 Futures

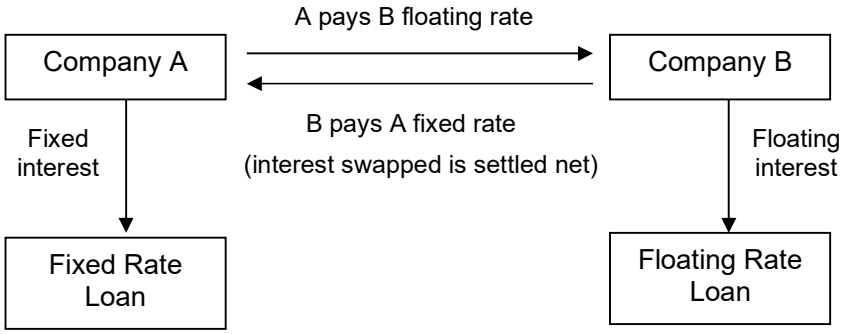
- An agreement to buy or sell an underlying asset at a specified price and future date
- **Exchange traded** with standardized features
- Futures contracts can be for agricultural commodities, but more commonly are for financial assets such as equity, interest rates and foreign currency
- **Initial margin** is paid at the beginning of the contract, with margin calls following, if the position loses sufficient money – daily marking to market will trigger margin calls
- Futures are usually **closed out**, prior to expiry, with a buy being cancelled by a sell and vice versa. A small number are settled by physical delivery

2.2 Forwards

- Two parties agree to buy and sell an asset at an agreed price, at an agreed time in the future
- Unlike futures, forward contracts are traded OTC and terms are not standardized
- There are no margin/collateral requirements to assure contract performance, resulting in credit (counterparty) risk
- **Forward rate agreements (FRAs)** are forward contracts between two parties that lock them into an agreed fixed interest rate over a stated period of time

2.3 Swaps

- Two parties agree to exchange (swap) income streams derived from a portfolio of assets or liabilities
- The most popular types are **interest rate swaps** and **currency swaps**, which are traded **OTC** and are **highly customized**
- With interest rate swaps, loan principals are not swapped and net interest is exchanged between parties
- With currency swaps, principals are swapped and gross interest payments are exchanged
- The principles of a fixed for floating interest rate swap are outlined below:



2.4 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
- Examples **of OTC options** are: interest rate options; currency options; and exotic options
- A **swaption** is an option to enter into a swap agreement
- **American style options** can be exercised up to and on the expiry date
- **European style options** can only be exercised on the expiry date

3. USES OF DERIVATIVE PRODUCTS

- Broadly speaking, derivatives can be used to:
  - Hedge against price risk
  - Switch, or allocate assets
  - Make a profit

3.1 Hedging

- Derivatives can be used to hedge against adverse movements in price
- There are two types of hedging:
  1. Hedging a **current market position**
  2. Hedging a **future transaction**

Hedging a Current Market Position		**Hedging a Future Transaction**	
Position	**Price Risk**	**Position**	**Price Risk**
Holding a portfolio of assets	Fall in asset prices	Planning to buy assets	Rise in asset prices
Holding a portfolio of liabilities (floating rate borrower)	Rise in interest rates	Planning to sell assets	Fall in asset prices
Holding a portfolio of assets (floating rate lender)	Fall in interest rates	Planning to borrow money	Rise in interest rates
		Planning to lend money	Fall in interest rates

3.1.1 Hedging a Current Market Position

- Let's look at a fund holding an equity portfolio

Physical Market	**Derivatives Market**
1. Fund holds an equity portfolio	
	2. Sells equity futures to hedge position
3. Equities fall 10%	4. Equity futures fall 10%
5. Value of portfolio falls 10%	6. Buys back equity futures for 10% less than they were sold for
7. Loss in physical market offset by profit made on derivatives trade	

3.1.2 Hedging a Future Transaction

- Let's look at a fund planning to purchase a large portfolio of equities in three months' time

Physical Market	Derivatives Market
1. Fund intends to buy an equity portfolio in three months' time	
	2. Buys equity futures to hedge its intended purchase
3. Equities rise 10%	4. Equity futures rise 10%
5. Cost of the portfolio that the fund intends to buy has risen by 10%	
	6. Sells equity futures for 10% more than they were bought for
7. Three months later, the fund makes its purchase, the increased cost in the physical market offset by profit made on the derivatives trade	

3.2 Asset Switching

- Switching funds from underperforming classes to outperforming ones is an important task for a portfolio manager in generating returns from the portfolio
- Derivatives can help fund managers re-weight their portfolios, as exposure to certain asset classes can be achieved without having to alter in any material way the physical asset mix of the portfolio
- Example: an asset manager wishing to move out of interest-rate securities and into equities could buy equity derivatives (gaining exposure to increases in equity values) and sell interest rate derivatives (locking in a selling price)

3.3 Making a Profit

- There are three trading strategies to make a profit from derivatives:
  1. **Directional trading** occurs when there is an expectation of the future direction of prices and a trade is implemented to take advantage of it
  2. **Spread trading** involves a long and a short position to take advantage of an expected movement in price
  3. **Arbitrage trading** occurs when a mispricing is identified between the cash and derivative prices and exploited through the simultaneous purchase/sale of the underlying asset and the sale/purchase of the derivative

4. PARTICIPANTS IN DERIVATIVES MARKETS

4.1 Hedgers

- Financial institutions such as banks, fund managers, insurance companies and large trading companies have substantial portfolios (debt, equity, FX) exposed to price risk
- Consequently, they are major users of derivatives to hedge current and future market positions

4.2 Speculators

- Speculators add liquidity and depth to the market
- They trade derivatives to make a profit, not to hedge. They buy low and sell high
- Some hedge funds specialise in speculating on the future direction of prices by using derivative markets
- Use of derivatives avoids the need to outlay large amounts of capital and can allow investors to profit in both rising and falling markets

4.3 Arbitrageurs

- **Arbitrage** is the making of risk-free profit by exploiting price differences of securities
- Arbitrage activity accounts for a substantial proportion of market turnover and contributes to market efficiency
- Examples of investment products used in arbitrage are depositary receipts and underlying stocks, and an index futures contract and the index's constituent stocks
- In practice, most arbitrage activity involves securities listed on SEHK and futures traded on HKFE. Such arbitrage tends to be conducted by the **proprietary trading desks of EPs**

> ***Arbitrage Example***
> *Suppose there is a stock futures contract, due for delivery tomorrow, for 1,000 shares in Examinator Limited, with a contract price of $20 per share. The total value of this futures contract is $20,000.*
>
> *Suppose that in the physical market, the price of Examinator Limited is $19.90. What is the arbitrage trade and what profit will accrue?*
>
> ***Answer***
> By selling a futures contract for $20 and buying 1,000 shares at $19.90, $0.10 profit will be made on each share.
>
> 1,000 shares x $0.10 = $$100 profit

- As arbitrage trades proceed, the market price and the derivative price will converge
- Central to why prices are different in the cash and derivatives markets is the concept of "cost of carry"