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Part I

Financial Markets and Products

Chapter 1

Things to Understand

- treasury bonds conversion factors
- future on bond calculations
- derivation of lower and upper option bounds
- earlier exercise of American options

Chapter 2

Banks

2.1 Bank Types

Banks that are heavily involved in wholesale banking and may fund their lending by borrowing in financial markets are referred to as **money center banks**.

2.2 Commercial Banking

Among the issues addressed by regulation is

- the capital that banks must keep
- the activities they are allowed to engage in
- deposit insurance
- and the extent to which mergers and foreign ownership are allowed

2.3 Volcker rule

Prevents proprietary trading by deposit-taking institutions.

2.4 Capital Requirements

Equity capital is characterised as "Tier 1 capital", while subordinated long-term debt is categorised as "Tier 2 capital".

2.5 Bank failures in the US in 1980-1990

The total number of failures during this decade was over 1,000 (larger than for the whole 1933 to 1979 period).

2.5.1 Reasons

There were several reasons for this:

- the way banks manages interest rate risk
- the reduction in oil and other commodity prices, which led to many loans to oil, gas, and agricultural companies not being repaid
- the existence of deposit insurance allowed banks to follow risky strategies that would not otherwise be feasible. For example, they could increase their deposit base by offering high rates to depositors ans use the funds to make risky loans.

2.5.2 Moral hazards

It can be defined as the possibility that the existence of insurance changes the behaviour of the insured party.

2.6 Investment Banking

2.6.1 Security Issuance

- **private placement** - the securities are sold to a small number of large institutional investors
- **public offering** - the securities are offered to the general public. May be on a basis of
  - **best efforts** - the investment bank does as well as it can to place the securities with investors and is paid a fee that depends, to some extend, on its success.
  - or **firm commitment** - the investment bank agrees to buy the securities from the issuer at a particular price and then attempts to sell them in the market for a slightly higher price. If for any reason it is unable to sell the securities, it ends up owning them itself.

When equity financing is being raised and the company is already publicly traded, the investment bank can look at the prices at which the company's shares are trading a few days before the issue is to be sold as a guide to the issue price. Typically it will agree to attempt to issue new shares at a target price slightly below the current price. The main risk then is that the price of

the company's shares will show a substantial decline before the new shares are sold.

2.6.2 IPO

When the company wishing to issue shares is not publicly traded, the share issue is known as an **initial public offer (IPO)**.
These types of offering are typically made on a best effort basis.

2.6.3 Possible Problems with IPO-s

- it is difficult to determine the fair share price
- the bank will typically try to set the offering price below its best estimate of the market price.
- possible spinning

Spinning

Spinning is the practice of an investment bank offering under-priced shares of a company's initial public offering to the senior executives of a third party company in exchange for future business with the investment bank.
Those opposed the practise liken IPO spinning to a disguised form of a corporate bribery and believe that it cheats two classes of investors:

- the shareholders in the third party company who are unable to receive similar favorable IPO terms as those received by its senior executives, and that constitutes a breach of **fiduciary duty** to shareholders required of

the company's senior executives, specifically that they not use their corporate office to extract favours that are not shared equally by all shareholders.

- the **retail** shareholder public who are compelled to purchase large sizes of stock in an IPO at exorbitant prices from the special favoured executive friends of the brokerage underwriting the IPO.

Dutch Auction Approach Some companies go for a Dutch Auction.
As for a regular IPO, a prospectus is issued and usually there is a road show. Individuals and companies bid by indicating the number of shares they want and the price they are prepared to pay. Shares are first issued to the highest bidder, and so on, until all the shares have been sold. The price paid by all successful bidders is the lowest bid that leads to a share allocation.
Dutch auctions potentially overcome two of the IPO problems we have mentioned:

- the price that clears the market should be the market price if all potential investors have participated in the bidding process
- the situations where investment banks offer IPOs only to their favoured clients are avoided

However, the company does not take advantage of the relationships that investment bankers have developed with large investors that usually enable the investment bankers to sell an IPO very quickly.

2.6.4 Poison Pills

Some examples:

- a potential target adds to its charter a provision where, if another company acquires one-third of the shares, other shareholders have the right to sell their shares to that company for twice the recent average share price
- a potential target grants to its key employees stock options that vest (i.e., can be exercised) in the event of a takeover. This is liable to create an exodus of key employees immediately, leaving an empty shell for the new owner

Poison pills should be approved by the majority of the shareholders.

2.6.5 Securities Trading

2.6.6 Advisory Services

2.6.7 Potential Conflicts of Interest in Banking

Fiduciary Account - a customer account where the bank can choose trades for the customer.

2.7 Accounting

For activities not associated with fees, there is an important distinction between the "banking book" and "trading book".
The **trading book** includes all the assets and liabilities the bank has as a result of its trading operations.
The **banking book** includes loans made to corporations and individuals. These are not marked to market. If a borrower is up-to-date on principal and interest

payments on a loan, the loan is recorded in the bank's books at the principal amount owed plus accrued interest. If payments due from the borrower are more than 90 days past due, the loan is usually classified as a *non-performing loan*. The bank does not then accrue interest on the loan when calculating its profit. When problems with the loan become more serious and it becomes likely that principal will not be repaid, the loan is classified as a *loan loss*.

A bank creates a reserve for loan losses. This is a charge against the income statement for an estimate of the loan losses that will be incurred. Actual loan losses are charged against reserves.

2.8 The Originate-to-Distribute Model

Originate-to-Distribute Model involves the bank originating but not keeping loans. Portfolios of loans are packaged into tranches which are then sold to investors.

In the mortgage market the government sponsored agencies (the Government National Mortgage Association (GNMA - "Ginnie Mae"), the Federal National Mortgage Association (FNMA - "Fannie Mae"), and the Federal Home Loan Mortgage Corporation (FHLMC - "Freddie Mac")) buy pools of mortgages from banks and other mortgage originators, guarantee the timely repayment of interest and principal, and then package the cash flow streams and sell them to investors.

The investors typically take what is known as prepayment risk. This is the risk that interest rates will decrease and mortgages will be paid off earlier than expected. However, they do not take any credit risk, because the mortgages are guaranteed by GNMA, FNMA of FHLMC.

The originate to distribute model is also termed **securitisation**.

2.8.1 Advantages of the Securitisation

By securitising its loans, bank:

- gets them off its balance sheet
- frees up funds to enable it to make more loans
- frees up capital that can be used to cover the risks being taken elsewhere in bank (this is particularly attractive if the bank feels that the capital required by regulators for loan is too high)
- bank earns a fee for originating a loan and a further fee if is services the loan after it has been sold

2.9 The Risks Facing Banks

Capital is now required for three types of risk:

- credit risk
- market risk
- and operational risk

2.9.1 Credit Risk

Credit risk is the risk that counter-parties in loan and derivatives transactions will default. This has traditionally been the greatest risk facing a bank and is usually the one for which the most regulatory capital is required.

2.9.2 Market Risk

Market Risk arises primarily form the banks's trading operations. It is the risk related to the possibility that instruments in the bank's trading book will decline in value.

2.9.3 Operational Risk

Operational risk, which is often considered the biggest risk facing banks, is the risk that losses are made because internal systems fail to work as they are supposed to or because or external events.
The time horizon used by regulators for considering losses from credit and operational risks is one year, whereas the time horizon for considering losses from market risks is usually much shorter.
For example, in the case of credit and operational risk, the capital is chosen so that the chance of unexpected losses exceeding the capital in a year is 0.1%.

2.9.4 Economic Capital

In addition to calculating regulatory capital, most large banks have systems in place for calculating what is called **economic capital**. Economic capital is often less than regulatory capital.
The form the capital can take (equity, subordinated debt, etc.) is prescribed by regulators.

Chapter 3

Insurance Companies

3.1 General

The role of insurance companies to provide protection against adverse events. The company or individual seeking protection is referred as the **policyholder**. The policyholder makes regular payments, known as premiums, and receive payments from the insurance company if the specified event occurs.

3.1.1 Types of Insurances

- **life insurance**
- **non-life** or **property-casualty insurance**
- **health insurance**

A life insurance contract typically lasts a long time and provides payments to the policyholder's beneficiaries that depend on when the policyholder dies.

A property-casualty insurance contract typically lasts one year (although it may be renewed) and provides compensation for losses from accidents.

3.1.2 Life Insurance

Outside the United States, term **life assurance** is often used to describe a contract where the event being insured against is certain to happen at some future time (e.g., a contract that will pay on the policyholder death).
Life insurance is used to describe a contract where the event being insured against may never happen(for example, a contract that provides a payoff in the event of the accidental death of the policyholder).
In the United States, all types of life policies are referred to as life insurance.

3.1.3 Term Life Insurance

Term or **temporary life insurance** lasts predetermined number of years. **If the policyholder does not die during the term of the policy, no payments are made by the insurance company**.
The face amount of the policy typically stays the same or declines with the passage of time.
Annual renewable term policy - the insurance company guaranteed to renew the policy from one year to the next at a rate reflecting the policyholder's age without regard to the policyholder's health.
A common reason for term life insurance is a mortgage.

3.1.4 Whole Life Insurance

Whole or **permanent life insurance** provides protection for the life of the policyholder.

In the case of **term life insurance, there is no certainty that there will be a payout**, but in the case of **whole life insurance, a payout is certain to happen provided the policyholder continues to make the agreed premium payments**.

Whole life insurance requires considerably higher premiums than term life insurance policies.

Usually, the payments and the face value of the policy both remain constant through time.

Policyholders can often redeem (surrender) whole life policies early or use the policies as collaterals for loans.

When a policyholder wants to redeem a whole life policy early, it is sometimes the case that an investor will buy policy form the policyholder for more than the surrender value offered ba the insurance company. **The investor will then make premium payments and collect the face value from the insurance company when the policyholder dies**.

The annual premium for a year can be compared with the cost of providing therm life insurance for that year.

There are tax advantages associated with life insurance policies in many countries. If the policyholder invested the surplus premiums, tax would normally be payable on the income as it was earned. But, when the surplus premiums are invested within the insurance policy, the tax treatment is often better. Tax is deferred, and sometimes the payout to the beneficiaries of life insurance policies is free of income altogether.

Variable Life Insurance

Variable Live (VL) Insurance is a form of whole life insurance **where the surplus premiums are invested in a fund, chosen by the policyholder**. **This could be an equity fund, a bond fund, or a money market fund**. Income earned from the investments can sometimes be applied toward the premiums.

Universal Life

Universal life (UL) insurance is a form of whole life insurance, in which **the policyholder can reduce the premium down to a specified minimum without the policy lapsing**.
The surplus premiums are invested by the insurance company in fixed income products such as bonds, mortgages, and money market instruments. The insurance company guarantees a certain minimum return, say 4%, on these funds.
The policyholder can choose between two options:

- a fixed benefit is paid on death
- or the policyholder's beneficiaries receive more than the fixed benefit if the investment return is greater than the guaranteed minimum.

Premiums are lower for the first option.

Variable-Universal Life Insurance

Variable-universal life (VUL) insurance blends the features found in variable and universal life insurances.
The policyholder can choose between a number of alternatives for the investment of surplus premiums.

The insurance company guarantees a certain minimum death benefit and interest on the investments can sometimes be applied toward premiums.
Premiums can be reduced down to a specified minimum without the policy lapsing.

Endowment Life Insurance

Endowment life insurance lasts for a specified period and pays a lump sum either when the policyholder dies or at the end of the period, whichever is first.
The amount that is paid out can be specified in advance as the same regardless of whether the policyholder dies or survives to the end of the policy.
Sometimes the payout is also made if the policyholder has a critical illness.

With-profits Endowment Life Insurance - the insurance company declared periodic bonuses that depend on the performance of the insurance company's investments.
These bonuses accumulate to increase the amount paid out to the policyholder, assuming the policyholder lives beyond the end of the life of the policy.

Unit-linked Endowment Life Insurance - the amount paid out at maturity depends on the performance of the fund chosen by the policyholder.

Pure Endowment Life Insurance has the property that a **payout occurs only if the policyholder survives to the end of the life of the policy**.

Chapter 4

Mutual and Hedge Funds

4.1 Mutual Funds

4.1.1 Benefits

- diversification
- low cost of investments

One of the attractions of mutual funds for the small investor is the diversification opportunities they offer.
A mutual fund provides a way in which resources of many small investors are pooled so that the benefits of diversification are realized at a relatively low cost.

4.1.2 Mutual Fund Types

Money market mutual funds invest in interest-bearing instruments, such as Treasury bills, commercial paper, and bankers' acceptances, with a life of less than

one year. They are an alternative to interest-bearing bank accounts and usually provide a higher rate of interest because they are not used by a government agency.

Money market fund investors are typically risk-averse and do not expect to lose any of the funds invested.

Stable value funds are a popular alternative to money market funds. They typically invest in bonds and similar instruments with lives up to five years.

4.1.3 Net Asset Value

The total number of shares outstanding goes up as investors buy more shares and down when shares are redeemed.

Mutual funds are valued at 4 p.m. each day.

This involves the mutual fund manager calculating the market value of each asset in the portfolio so that the total value of the fund is determined. This total value is divided by the number of shared outstanding to obtain the value of each share. The latter is referred to as the net asset value (NAV) of the fund. Shares in the fund can be bought from the fund and sold back to the fund at any time.

When an investor issues instructions to buy or sell shares, it is the next calculated-NAV that applies to the transaction.

Chapter 5

Markets

5.1 Over The Counter Markets

Prior to the credit crisis, OTC derivative markets were largely unregulated. Following the credit crisis, new regulations were developed. The main objectives of the regulations are to improve the transparency of OTC markets and reduce systemic risk. The over-the-counter-market in some respects is being forced to become more like the exchange-traded market. The important changes are:

- standardised OTC derivatives between two financial institutions in the United States must, whenever possible, be traded on what are referred to

Chapter 6

IR Futures

6.1 Day Count Conventions

6.1.1 Day Count Convention in the US

Convention	**Fixed Income Instruments**
actual/actual	Treasury Bonds
30/360	Corporate and Municipal Bonds
actual/360	Money Market Instruments

6.1.2 Day Count Convention in other countries

Convention	Fixed Income Instruments
actual/actual	brr
30/360	brr
actual/360	LIBOR for all currencies except sterling
actual/365	Money Market Instruments in Australia, Canada and New Zealand LIBOR for sterling Euro and sterling-denominated bonds

6.2 Price Quotations For US Treasury Bills

The prices of money market instruments are quoted using ***discount rate***.
This is the interest earned as a percentage of the final face value rather than as a percentage of the initial price paid for the instrument.

$$Discount = \frac{\text{No. of Days to Maturity}}{360} \cdot \text{Quote Price} \tag{6.1}$$

And the clean price is:

$$\text{Cash Price} = \text{Face Value} - \text{Discount} \tag{6.2}$$

6.3 Price Quotations for US Treasury Bonds

Treasury bond prices in the United States are quoted in dollars and thirty-seconds of a dollar.

6.4 Clean and Dirty Prices

$$\text{Quoted Price} = \text{Clean Price} \tag{6.3}$$

$$\begin{aligned}\text{Cash Price Paid by The Traders} &= \text{Dirty Price} \qquad (6.4)\\ &= \text{Quoted (Clean) Price} + \text{Accrued Interest}\end{aligned}$$

6.5 Treasury Bond Futures

Treasury Bond Future Contract is traded by CME.

In this contract, any government bond that has maturity between 15 and 25 years to maturity on the first date of the delivery month can be delivered.

The ultra T-bond contract, where any bond with maturity over 25 years can be delivered.

There are also 10-year, 5-year and 2-year Treasury note futures contracts.

6.5.1 Quotes

Treasury bond and Treasury note futures contracts are quoted in dollars and thirty-seconds of a dollar per $100 value.

This is similar to the way the bonds are quoted in the spot market.

The settlement price of the 10-year Treasury note futures contract is quoted to the nearest half of thirty-second.

The 5-year and 2-year Treasury note contracts are quoted even more precisely, to the nearest quarter of a thirty-second.

6.5.2 Conversion Factor

Conversion Factor is the factor that is used to estimate the price received by the short party for the deliverable bond.

The applicable quoted price for the bond delivered is the product of the conversion factor and the most recent settlement price for the futures contract.

Taking accrued interest into account, **the cash received by the party with the short position for each $100 face value of the bond delivered is**:

$$\text{Cash Price} = \Big(\text{Most Recent Settlement Price} \times \text{Conversion Factor}\Big) + \text{Accrued Interest}$$

Steps to Calculate the Conversion Factor Let us assume that the interest rates (for discounting purposes) are equal to 6% for all the maturities with semi-annual compounding

- round the times to the coupon payment dates and to the bond maturity to the nearest 3 months
  - if, after rounding, the bond does not last for an exact number of 6-month periods, the first coupon is assumed to be paid in 6 months
  - if, after rounding, the bond does last for an exact number of 6-months periods (i.e., there are an extra 3 months), the first coupon is assumed to be paid after 3 months and accrued interest is subtracted.
- divide by the face value

$$\text{Conversion Factor} = \frac{\text{Discount Price} - \text{Accrued Interest}}{FaceValue} \tag{6.5}$$

Cost of Delivery

$$\text{Cost of Delivery} \quad = \quad \text{Quoted Bond Price} - \Big(\text{Future Last Settlement Price} * \text{Conversion Factor}\Big)$$

Which Bonds Are Cheapest to Deliver

- bond yields **above** 6% - **low-coupon**, **long maturity** bonds
- bond yields **below** 6% - **high-coupon**, **short-maturity** bonds
- yield curve is **upward-sloping** - bonds with **long-time** to maturity
- yield curve is **downward-sloping** - bonds with **short-time** to maturity

Example 1 A 10% coupon bond with 20 years and 2 months to maturity:

- new maturity - 20 years
- the conversion factor:

$$\text{Conversion Factor} \quad = \quad \sum_{i=1}^{40} \frac{5}{1.03^i} + \frac{100}{1.03^{40}} = 146.23 \qquad (6.6)$$

- dividing by the face value, we get - 1.4623

Example 2 A 8% coupon bond with 18 years and 4 months to maturity:

- maturity used for the conversion factor calculations - 18 years and 3 months
- discounting all the payments back to a point in time 3 months from today

at 6% per annum (compounded semi-annually) gives a value of:

$$4 + \sum_{i=1}^{36} \frac{4}{1.03^i} + \frac{100}{1.03^{36}} \quad = \quad \$125.8323 \tag{6.7}$$

where 4 - is the interest accrued from the last coupon date to the date 3-months forward

- the interest rate for a 3-months period is

$$\sqrt{1.03} - 1 = 1.4889\% \tag{6.8}$$

- hence, discounting back to the present gives the bond's value as

$$125.8323/1.014889 \quad = \quad \$123.99 \tag{6.9}$$

- subtracting the accrued interest of 2.0, this becomes 121.99
- the conversion factor is therefore 1.2199

Example 3 - Calculating the Conversion Factor Using the Calculator

Question N 693 from the question bank.

Steps:

1. number of payments after rounding the maturity - N
2. discount rate for half a year (as a percentage - say, 9.5% will be entered as 9.5) - I/Y
3. face value - FV
4. semi-annual coupon - that is the annual coupon divided by 2 (as a percentage - say, 8% annual coupon is entered as 4) - PMT

5. CPT

6. PV

7. divide by the face value

6.6 Euro-Dollar Futures

A Euro-Dollar is a dollar deposited in a U.S. or foreign bank outside the US. The Euro-Dollar interest rate is the rate earned on Euro-Dollars deposited by one bank with another bank.

A three-month Euro-Dollar futures contract is a futures contract on the interest that will be paid (by someone who borrows at the LIBOR interest rate) on $1 million for a future three-month period.

The last trading day is two days before the third Wednesday of the delivery month.

At 11 a.m. on the last trading day, there is a final settlement equal to $100 - R$, where R is the three-month LIBOR fixing on that day, expressed with quarterly compounding and an actual/360 day count convention.

The contract price is defined as:

$$10,000X\Big[100 - 0.25X\big(100 - Q\big)\Big] \tag{6.10}$$

where Q is the quote price.

A trader who is long gains when the interest rates fall and who is short gains when interest rate rise.

The contract is designed so that a one-basis-point (= 0.01) move in the futures quote corresponds to a gain or loss of $25 per contract.

A one-basis-point change in the futures quote correspond to a 0.01% change in

the underlying interest rate.

6.6.1 Difference with FRA

a Euro-Dollar futures contract is similar to a FRA.

- **settlement frequency** - the Euro-Dollar contract is settled daily whereas the FRA is not settled daily.
- **settlement timing** - in a Euro-Dollar future contract, the final settlement occurs at time $T1$. In FRA, the final settlement occurs at time $T2$ and equals to the difference between the forward and the realised interest rate.

6.6.2 Why Expected Forward Rate is Below The Future Rate

For short maturities (up to a year or so), the Euro-Dollar future interest rate can be assumed to be the same as the corresponding forward interest rate.
For longer-dated contracts, difference between the contracts become important. Both components of the difference between the Euro-Dollars and FRA decrease the forward rate relative to the future rate, but for long-dated contracts the reduction caused by the second difference is much smaller than that caused by the first.

Daily Settlement Suppose you have a contract where the payoff is $R_M - R_F$ at time T_1,
where:

- R_F - is a predetermined rate for the period between T_1 and T_2

- and R_M - is the realised rate for this period

and you have an option to switch to daily settlement. In this case daily settlements lead to cash inflows when rates and high and cash outflows when rates are low. You would therefore find switching to daily settlement to be attractive. As a result the market would therefore set R_F higher for the daily settlement alternative (reducing you cumulative expected payoff). To put this the other way around, switching from daily settlement to settlement at time T_1 reduces R_F.

Settlement Timing To understand the reason why the second difference reduces the forward rate, suppose that the payoff of $R_M - R_F$ is at time T_2 instead of T_1 (as it is for a regular FRA).
If R_M is high, the payoff is positive. Because rates are high, the cost to you of having the payoff that you receive at time T_2 rather than time T_1 is relatively high. If R_M is low, the payoff is negative. Because the rates are low, the benefit to you of having the payoff you make at time T_2 rather than time T_1 is relatively low. Overall you would rather have the payoff at time T_1. If it is at time T_2 rather than T_1, you must be compensated by a reduction in R_F.

6.6.3 Convexity Adjustment

$$\text{Forward Rate} \quad = \quad \text{Futures Rate} - \frac{1}{2}\sigma T_1 T_2 \tag{6.11}$$

Chapter 7

Swaps

7.1 Swaps

A swap is an over-the-counter derivatives agreement between two companies to exchange cash flows in the future. The agreement defines the dates when the cash flows are to be paid and the way in which they are to be calculated.

7.2 Fixed-For-Floating Swap

The notional is not exchanged. This is why it is termed the notional principal. The procedure:

- calculate the forward rates for each of the LIBOR rates that will determine swap cash flows
- calculate the swap cash flows on the assumption that LIBOR rates will equal to the forward rates
- discount the swap cash flows at the risk free rates

7.3 Fixed-For-Fixed Currency Swap

7.3.1 Valuation

$$\text{Value of Currency Swap} \quad = \quad \text{PV of payments}_{USD} - \text{Spot Exchange Rate} * \text{PV of payments}_{GBP}$$

7.3.2 Total Gain

The total gain as per comparative advantage is equal to the difference of the differences:

- calculate the difference in one currency
- calculate the difference in another currency
- take the difference of the differences

7.3.3 Value For Counterparties

For the payer of the low-interest-rate currency, the swap will have negative value during the later part of the swap life.

Chapter 8

Options

8.1 Contract Size

Contract size is usually a lot of 100 shares.

8.2 Expiry Times

Usually up to one year.

8.3 LEAPS

Long-term equity anticipation securities are a type of options that has an expiration date of up to 39 months.

8.4 Expiry Date

Usually the third Friday of the month in which the specific contract expires.

8.5 Flex Options

These are options where traders agree to non-standard terms.

8.6 Option Adjustments

Options are only adjusted for stock splits or stock dividends, as in both the cases the number of shares/stocks will increase.
On the other hand, options are not adjusted for cash dividends. The consequences of cash dividends are incorporated in option valuation models.

8.7 Fiduciary Call

A fiduciary call is a cost effective strategy designed to limit the costs associated with exercising a call option.
A fiduciary call is a combination or a portfolio consisting of a zero-coupon bond which pay X amount at maturity and a call option with the strike price of X. The payoff of the fiduciary call is X if the call option expires out of the money, and it is S (current price) if the call option expires in the money.
The put-call parity is the combination of a fiduciary call and a protective put.

8.8 Put-Call Parity

The put-call parity is constructed from a fiduciary call and a protective put, where the discount bond face value should be equal to the strike price for call and put.

8.9 Packages

A package is a portfolio consisting of standard European calls and puts, forward contracts, cash and the underlying asset itself.
Often a package is constructed so that it has zero cost initially.

8.10 Range Forward Contract

It consists of a long call and short put or a short call ans a long put. The call strike price is greater than the put strike price and the strikes are chosen so that the value of the call equals the value of the put.

8.11 Gap Options

A gap call option is a European call option that pays off $S_T - K_1$ when $S_T > K_2$. The difference between a gap call option and a regular call option with a strike price of K_2 is that the payoff when $S_T - K_2$ is increased by $K_2 - K_1$. This increase is positive or negative depending on the sign $K_2 - K_1$.

8.12 Clique Options

A cliquet option (which is also called a ratchet or strike reset option) is a series of call or put options with rules for determining the strike price.

8.13 Compound Options

Compound options are options on options. Compound options have 2 strikes and 2 exercise dates.

8.14 Chooser Option

After specified period of time the holder can choose whether the option is a call or a put.
The chooser option is a package consisting of:

1. a call option with strike K and maturity T_2
2. $e^{-q\cdot\left(T_2-T_1\right)}$ put options with the strike $Ke^{-(r-q)\cdot\left(T_2-T_1\right)}$ and maturity T_1

8.15 Parisian Option

Is a barrier option where the asset price has to be above or below the barrier for a period of time for the option to be knocked in or out.

8.16 Lookback Options

The payoffs from lookback options depend on the maximum or minimum asset price reached during the life of the option.

The payoff from the floating lookback call is the amount that the final price exceeds the minimum asset price achieved during the life of the option. The payoff from a floating lookback put is the amount by which the maximum asset price achieved during the life of the option exceeds the final asset price.

For a fixed lookback option, a strike is specified and is used instead of the final underlying price.

8.17 Employee Options

Employee options are considered synonymous to forward start options. The employer commits to grant an at-the-money option at a future date.

8.18 Static Option Replication

This involves searching for a portfolio of actively traded options that approximately replicates the exotic option. Shorting this position provides the hedge.

The basic principle underlying static option replication is as follows: if two portfolios are worth the same on a certain boundary, they are also worth the same at all interior points of the boundary.

Chapter 9

Commodities

9.1 Cash-And-Carry Arbitrage Strategy

9.2 Reverse Cash-And-Carry Arbitrage Strategy

9.3 Short Selling and Lease Rate

The lease rate is the difference between the discount rate for the commodity and teh expected price appreciation.

Chapter 10

Exchanges

10.1 Exchange Functions

An exchange performs a number of functions:

1. **product standardisation**
2. **trading venue**
3. **reporting services**

10.2 Clearing

Clearing is the term that describes the reconciling and resolving of contracts between counter-parties, and takes place between trade execution and trade settlement (when all legal obligations have been made). The clearing is the process by which payment obligations between two or more parties are computed and netted.

- direct clearing
- clearing rings
- complete/central clearing - involves a central clearing house or central counter-party that acts as the counter-party in all transactions

10.3 Margining

Margining is a method of creating a layer of security or resources to cover the losses incurred during the period of a contract. That is, margining is a process which requires members to receive and pay cash and other assets against gains and losses in their positions, which provides coverage against losses in case of default.
It is used both in OTC and exchange markets.

10.4 Settlement

The settlement is the process by which the contract obligations are fulfilled.

10.5 Special Purpose Vehicle/Entity

SPV (or SPE) is a separate legal entity created to isolate a firm from financial risk. The company forming SPV translates some its assets to the SPV. If a specific counterparty in a derivative transaction defaults, the firm can still receive full settlement on its other transactions without the netting losses on the defaulted transactions.

An SPV transforms counterparty risk into legal risk. The obvious risk is that of consolidation, which is the power of a bankruptcy court to combine the SPV assets with those of the originator.

10.6 Derivative Product Companies

DPC are typically triple A-rated independently capitalized entities created by one or more banks as a bankruptcy remote subsidiary fo a major dealer. The purpose of DPCs is to provide external counterparties with a degree of protection against counterparty risk by protecting against the default of the parent bank or parent company.
DPC maintain a triple-A rating by a combination of capital, margin and activity restrictions.
The triple-A rating of DPC typically depends on:

- minimising market risk - DPCs can attempt to be close to market-neutral via trading offsetting contracts. Ideally, they would be on both sides of every trade as these 'mirror trades' leas to an overall matched book. Normally the mirror trades exists with the DPC parent.
- support from parent
- credit risk management and operational guidelines

10.7 Monolines

Monolines are types of insurance companies or financial guarantee companies with strong credit ratings that provide credit wraps ans credit default swaps to

achieve diversification and better return.

They are structured as an extension of a DPC that focused only on credit default swaps.

10.8 CCP-s

10.8.1 Questions with CCP-s

The first is whether **shifting priorities from one party to another** really helps the system as a whole. CCP-s will effectively give priority to OTC derivative counterparties and in doing so may reduce the risk in this market. However, this will make other parties (e.g. bondholders) worse off and may therefore increase risks in other markets.

Second, a **critical reliance on a precise sound legal framework** creates exposure to any of flaws in such a framework.

10.8.2 Differences with Mono-lines

CCP-s also share some similarities with monolines and CDPC-s as strong credit quality entities set up to take and manage counterparty credit risk.

However, there are two important differences with monolines:

- CCP-s have a **matched book** and do not take any residual market risk (except when members default). This is a critical difference since monolines and CCP-s have very large, mostly one-way, exposure to credit markets.
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Chapter 11

CCP-s

11.1