Financial Markets and Products

讲师：

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Financial Markets and Products

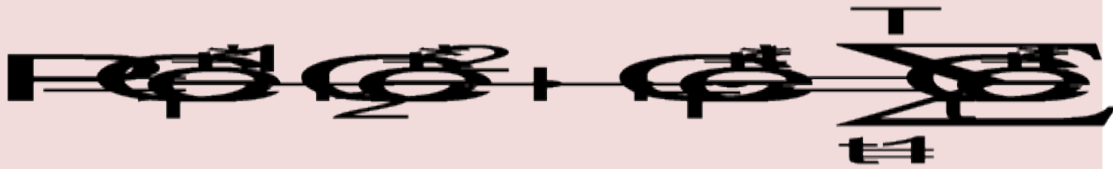
1. Bond Market
2. Forward
3. Futures
4. Swap
5. Option

Bond Market

1.Bond Basics

- 五要素
- Bond Valuation Principle
- Compounding Frequencies
- Effective Annual Rate(EAR)
- Risk-free Rates
- Spot and Forward Rate
- 风险因子（Duration & Convexity）

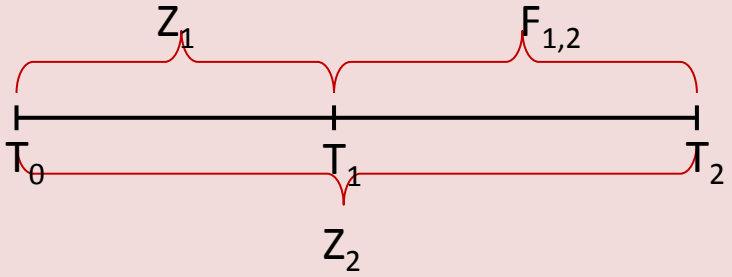
Bond Basics	★★★	计算
要素 （给出四个要素，用单利、复利求出第五个要素。）		Coupon rate
		Yield to Maturity(YTM)
		Maturity
		Face Value（FV）
		Present Value（PV）

Bond Valuation Principle	★★★	计算
Calculation	$P = \frac{C_1}{1+y} + \frac{C_2}{(1+y)^2} + \cdots + \frac{C_T}{(1+y)^T} = \sum_{t=1}^{T} \frac{C_t}{(1+y)^t}$	
		

Compounding Frequencies	★★★	计算
Simple Interest	◘ Simple interest is calculated on the original principal only.	
Compounding Interest	◘ Suppose we have an account where the simple interest is added in each year and then that money also earns interest. ◘ Annually, **semiannually**, quarterly, monthly, weekly, daily, **continuously compounding**.	
Calculation	$FV = PV\left(1+\frac{R_m}{m}\right)^{mn}$ $FV = PV \times e^{R_C \times n}$ $PV \times e^{R_c n} = PV\left(1+\frac{R_m}{m}\right)^{mn}$	

Effective Annual Rate(EAR)	★★★	计算
Calculation (会换算)	$EAR = \left(1+\frac{r}{n}\right)^{n} - 1$ $\quad n \to +\infty, EAR = e^{r} - 1$ n : number of compounding periods per year r : annual rate (quoted)	

Risk-free Rates	★★	计算
Treasury Rates	☐ Treasury rates are risk-free rates in the sense that an investor who buys a Treasury bill or Treasury bond is certain that interest and principal payments will be made as promised.	
LIBOR	☐ A LIBOR quote by a particular bank is the rate of interest at which the bank is prepared to make a large wholesale deposit with other banks.	
Repo Rates	☐ In a repurchase agreement, the difference between selling price (today) and the repurchased price (tomorrow or later) is called the repo rate.	

Spot and Forward Rate	★★★	计算
Spot Rate	☐ A t-period spot rate, or zero rate, denoted as z(t), is the yield to maturity on a zero-coupon bond that matures in t-years.	
Forward rate	☐ Interest rates corresponding to a future period implied by the spot curve.	
Spot & Forward Rate		

$$(1+Z_1)^{T_1}(1+F_{1,2})^{(T_2-T_1)} = (1+Z_2)^{T_2}$$

$$e^{Z_1T_1} \times e^{F_{1,2}(T_2-T_1)} = e^{Z_2T_2} \Rightarrow F_{1,2} = \frac{Z_2T_2 - Z_1T_1}{T_2 - T_1}$$

Risk Metrics - Duration	★★★	性质、计算

Metrics	Property and Calculation	
Macaulay Duration	◘ For a zero coupon bond, the Macaulay duration equals to its maturity. ◘ For consol, the Macaulay duration is 1+1/y.	$D=\frac{\sum_{t=1}^{T}\left[\frac{C_t}{(1+y)^t}\times t\right]}{\sum_{t=1}^{T}\frac{C_t}{(1+y)^t}}=\frac{\sum_{t=1}^{T}[PV(C_t)\times t]}{P}$ $=\sum_{t=1}^{T}\left[\frac{PV(C_t)}{P}\times t\right]=\sum_{t=1}^{T}(\omega_t\times t)$
Modified Duration	◘ All else being equal, duration increase for longer maturities, lower coupons, and lower the yields.	$MD=-\frac{\Delta P}{\Delta y}\times\frac{1}{P}=\frac{D_{Macaulay}}{1+y}$
Dollar Duration	$DD=-\frac{\Delta P}{\Delta y}=MD\times P$	**DV01** DV01 = MD× Bond Value ×0.0001
Effective Duration	$D^E=\frac{P_- - P_+}{2P_0\Delta y}$	**Portfolio Duration** ◘ Weighted sum of individual durations
Key Rate Duration	◘ Which is the key rate equivalent of durations.	
Key Rate 01s	◘ Which is the key rate equivalent of DV01.	

Risk Metrics - Convexity	★★★	性质、计算

Metrics	Property
Convexity	◘ A measure of the non-linear relationship between price and yield duration of a bond to changes in interest rates, the second derivative of the price of the bond with respect to interest rates (duration is the first derivative). ◘ All else being equal, convexity increase for longer maturities, lower coupons, and lower the yields.
Effective Convexity	$C^E = \frac{D_- - D_+}{\Delta y} = \left[\frac{P(y_0 - \Delta y) - P_0}{P_0 \Delta y} - \frac{P_0 - P(y_0 + \Delta y)}{P_0 \Delta y} \right] / \Delta y$
Portfolio Convexity	◘ Weighted sum of individual convexity

Price Change	★★★	计算

$$P = P_0 - D^* P_0 \Delta y + \frac{1}{2} C P_0 (\Delta y)^2$$

2.Bond Products

- Treasury Bonds
- Corporate bond
- Mortgage Loans &Mortgage-Backed Securities(MBS)

Treasury Bonds	★★	性质、计算
Types	◘ **Treasury Bills:** less than 1 year. $\text{cash price} = 100\left(1 - \text{discount-rate} \times \frac{n}{360}\right)$ ◘ **Treasury Notes:** a maturity between 1 and 10 years. ◘ **Treasury Bonds:** more than 10 years. Make interest payments semi-annually.	
Quoted Price	◘ **Treasury Notes and Treasury Bonds:** Dollars and thirty-seconds of a dollar with a face value of $100.	
Day Count Conventions	◘ **Treasury Bonds:** actual/actual ◘ **Corporate and Municipal Bonds:** 30/360 ◘ **Money Market Instruments (Treasury Bills):** actual/360	

Treasury Bonds	★★★	性质、计算
Accrued Interest	◘ The amount of any future interest that has accumulated by the time of the purchase. $AI = coupon \times \frac{\#\ of\ days\ from\ last\ coupon\ to\ the\ settlement\ date}{\#\ of\ days\ in\ coupon\ period}$	
Clean Price	◘ The price of a coupon bond not including any accrued interest. Immediately following each coupon payment, the clean price will equal the dirty price.	
Dirty Price	◘ A bond pricing quote referring to the price of a coupon bond that includes the present value of all future cash flows, including interest accruing on the next coupon payment. dirty price = clean price + accrued interest	

Corporate Bonds	★★	性质
Corporate Trustee	◘ The trustee acts in a fiduciary (legal) capacity on behalf of the investors. Acting on behalf of the bondholders, the trustee must ensure that the bond issuer is in compliance with the covenants of the indenture at all times.	
Zero-Coupon	◘ In bankruptcy, zero-coupon bond creditor claim original offering price plus accrued and unpaid interest, but not the principal amount of $1,000. ◘ A zero-coupon bond’ s interest rate is determined by the original issue discount (OID). The difference between the face amount and the offering price when first issued is called the original-issue discount.	
Retirement Mechanisms	◘ Call provision ◘ Sinking-fund provisions ◘ Maintenance and replacement funds ◘ Tender offers	

Mortgage Loans - Payments	★★★	计算
Principle	◘ The mortgage loan is fair in the sense that the present value of the monthly mortgage payments, discounted at the monthly compounded mortgage rate, equals the original amount borrowed.	
Monthly Payment	$X\sum_{n=1}^{12T}\frac{1}{\left(1+\frac{y}{12}\right)^{n}}=B(0)$	N = 12T, I/Y = y/12, PV = B(0), FV = 0 CPT PMT = ?
Interest Components	B(n) × y/12	
Principal Components	X – B(n) × y/12	

Mortgage Loans – Prepayment Option	★★★	性质、计算
Property	◘ Mortgage borrowers have a prepayment option, that is, the option to pay the lender the outstanding principal at any time and be freed of the obligation to make further payments. ◘ The prepayment option is valuable when mortgage rates have fallen.	
SMM	◘ Single monthly mortality rate ◘ Is the percentage of principal outstanding at the beginning of month n that is prepaid during month n. ◘ The SMM is often annualized to a constant prepayment rate or conditional prepayment rate (CPR). $CPR_n = 1 - (1 - SMM_n)^{12}$	

Agency Mortgage Pools Market	★★★	性质、计算
Specified Pools and TBAs	◘ In the specified pools market, buyer and sellers agree to trade a particular pool of loans. ◘ **TBA market** is a forward market with a delivery option. Seller will pick the CTD pool which is worth the least subject to the issuer, maturity, and coupon requirements.	
Dollar Rolls	◘ The buyer of the dollar roll sells a TBA for one settlement month and buys the same TBA for the following settlement month. ◘ Two difference with repo: 1) the buyer may not get back in the later month the same pool delivered in the earlier month. 2) the buyer does not receive any interest or principal payments from the pool over the roll.	

Valuing MBS	★★	性质、计算
Monte Carlo	◘ The Monte Carlo methodology is a simulation approach for valuing MBSs. ◘ Process: - Simulating the interest rate path and refinancing path. - Projecting cash flows for each interest rate path. - Calculating the present value of cash flows for each interest rate path, and calculating the theoretical value of the mortgage security.	
Spread	◘ **Zero-Volatility Spread (Z-Spread)** ◘ **Option-Adjusted Spread (OAS)** The OAS is the spread that, when added to all the spot rates of all the interest rate paths, will make the average present value of the paths equal to the actual observed market price plus accrued interest.	

3.Rating Agencies

- 级别分类：Investment & Speculative Grade Ratings
- Transition Matrices
- Rating Method
- Ratings Change Impact Bond Prices

Rating Agencies		★★	性质
Investment Grade Ratings			
Interpretation	**S&P**	**Moody’ s**	**Interpretation**
Highest rating. Extremely strong capacity to meet obligations.	AAA	Aaa	Highest quality, with minimal credit risk.
Capacity to meet its financial obligation is very strong.	AA+	Aa1	High quality and subject to very low credit risk.
	AA	Aa2	
	AA-	Aa3	
Capacity to meet obligation still strong but susceptible to adverse changes in economic conditions.	A+	A1	Considered upper-medium grade and subject to low credit risk.
	A	A2	
	A-	A3	
Exhibits adequate protection parameters.	BBB+	Baa1	Subject to moderate credit risk.
	BBB	Baa2	
	BBB-	Baa3	

Rating Agencies	★★	性质

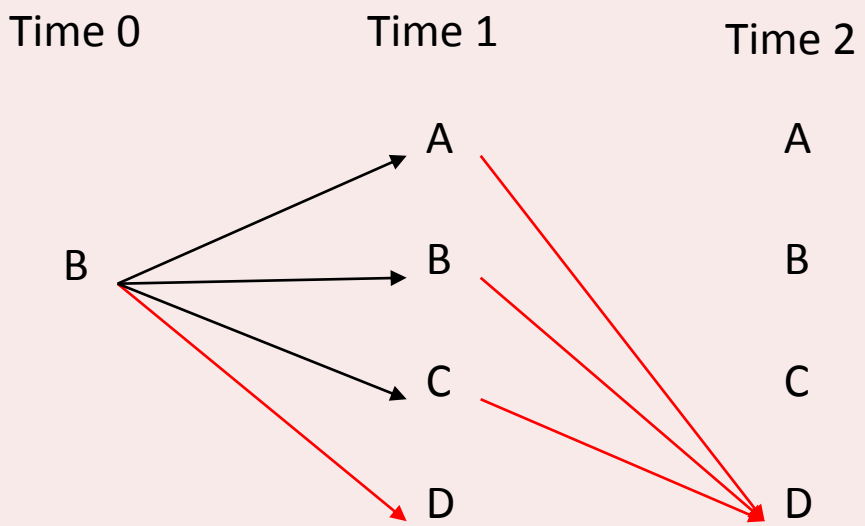
Speculative Grade Ratings			
Interpretation	**S&P**	**Moody's**	**Interpretation**
Less vulnerable to non-payment than other speculative issues but faces major ongoing uncertainties.	BB+	Ba1	Judged to have speculative elements and are subject to substantial credit risk.
	BB	Ba2	
	BB-	Ba3	
More vulnerable to non-payment than "BB" but has current capacity to meet financial obligation.	B+	B1	Considered speculative and are subject to high credit risk.
	B	B2	
	B-	B3	
Vulnerable to non-payment.	CCC+	Caa1	In poor standing.
	CCC	Caa2	
	CCC-	Caa3	
Highly vulnerable to non-payment.	CC/C	Ca	Highly speculative, likely to default.
In payment default.	D	C	Lowest rated bonds – typically in default, with little prospect for recovery.

Transition Matrices	★★★	性质、计算

Property

- Plot the frequency of rating migrations over time.

Rating From	Rating To			
	A	B	C	D
A	97%	3%	0%	0%
B	2%	93%	2%	3%
C	1%	12%	64%	23%
D	0%	0%	0%	100%



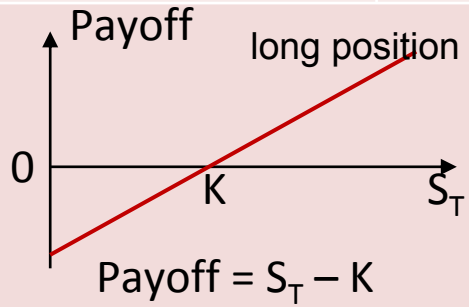
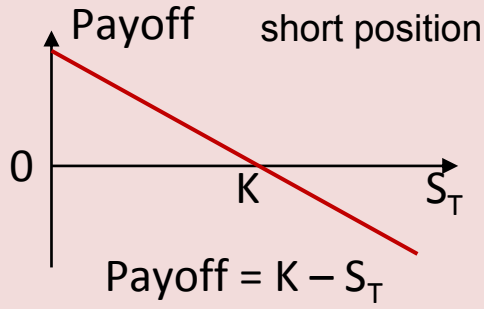
Rating Method	★★	性质
At-the-Point-in-Time	◘ Assesses credit quality over the near term.	
Through-the-Cycle	◘ Incorporate business cycles.	

Ratings Change	★★	性质
Ratings Change Impact Bond Prices	◘ Downgrades have a negative impact on bond prices. ◘ Upgrades have a positive impact. ◘ But the relationship is statistically stronger for upgrades than downgrades.	

Forward

Forward

- Forward Market
- Commodity Spread
- Forward Valuation
- Forward Rate Agreement
- Central Counterparty
- Other Counterparty Risk Mitigants

Forward Market	★★	性质
Difference with Futures Market	**Futures**	**Forward**
	Exchange-Traded	Over-the-Counter
	Backed by a Clearing house Daily Settlement	Trade with counterparty (Default Risk)
分类	**Commodity Forward Contract**	Underlying commodities mainly include: base metals - copper, aluminum, lead; precious metals - gold, silver, platinum; energy - WTI crude oil, Brent crude oil and so on.
	Financial Forward Contract	Similar to commodity forward contract, but the underlying asset is financial asset. For example, a foreign exchange contract or FRA.
Payoffs		

Commodity Spread	★★	性质、计算
Definition	◘ If we can take a long position in one commodity that is an input (e.g., oil) into another commodity that is an output (e.g., gas or heating oil), then we can take a short position in the output commodity and the difference is the commodity spread.	
Types	◘ Crush spread: Soybean vs. Soybean meal and oil ◘ Crack spread: Crude oil vs. gasoline or heating oil	

Forward Valuation	★★	计算
Calculation	$f = S_0 - Ke^{-rT}$; $f = S_0 - I - Ke^{-rT}$; $f = S_0 e^{-qT} - Ke^{-rT}$	

Forward Rate Agreement	★★★	性质、计算
Definition	◘ A FRA is an agreement that a certain rate will apply to a certain principal during a certain future time period.	
Property	◘ The buyer of an FRA locks in a borrowing rate, and the seller locks in a lending rate. The long benefits from an increase in rates, and the short benefits from a fall in rates. ◘ An FRA settles in one month on three-month LIBOR is called 1×4.	
Calculation	$\text{Settlement}(\text{If receiving } R_K) = \frac{L \times (R_K - R) \times (T_2 - T_1)}{1 + R \times (T_2 - T_1)}$ $\text{Settlement}(\text{If paying } R_K) = \frac{L \times (R - R_K) \times (T_2 - T_1)}{1 + R \times (T_2 - T_1)}$	

Central Counterparty	★★★	性质

Property	◘ **CCP** interposes itself as the counterparty to each transaction, and assumes the rights and obligations of the counterparties.		
Roles	◘ Set standards for clearing members ◘ Ensure netting of trades and the orderly close out of positions in a member default scenario ◘ Maintain margin; Make margin calls; Carry out trade settlement ◘ Maintain default fund for loss mutualization ◘ Managing the auction process		
Risks Faced by CCP	◘ Default risk ◘ Model risk	◘ Liquidity risk ◘ Operational risk	◘ Legal risk
	◘ Default of clearing member and its flow through effects is the most significant risk for CCP. Because of default, there may be the default or distress of other clearing members given that default correlation is likely to be high among OTC market participants.		

Central Clearing through CCPs	★★★	性质
Advantages	◘ Netting ◘ Margin ◘ Loss Mutualization ◘ Liquidity	◘ Transparency ◘ Legal/Operational Efficiency ◘ Default Management (Counterparty Risk)
Drawbacks	◘ **Failure of a CCP.** Would create systemic risk in the market. ◘ **Moral hazard.** CCPs may accept higher risk knowing that a government bailout in a default scenario is likely. ◘ **Costs.** Increased costs arising from tying up funds as initial margin. **(Procyclicality)** ◘ **Adverse selection.** A large counterparty that has better insight into risks than the CCP is likely to over-trade products for which the CCP underestimates risk, and vice verse. ◘ **Bifurcation.** Separation of trading into cleared and non-cleared can increase cash flow volatility.	
Note: Systemic risk can be both reduced and increased.		

Other Counterparty Risk Mitigants	★★★	性质
SPVs	**Special Purpose Vehicles** ◘ Bankruptcy remote legal entities set up by a parent firm to shield the SPV from any financial distress of the firm. SPVs essentially transform counterparty risk into legal risk.	
DPCs	**Derivatives Product Companies** ◘ Bankruptcy remote subsidiaries of firms set up to originate derivatives products sold to investors.	
Monolines	**Monolines** ◘ Highly-rated insurance companies that provide financial guarantees, or "credit wraps" to investors.	
CDPCs	**Credit Derivative Product Companies** ◘ Akin to DPCs, but with a business model that is closer to that of a monoline.	

Futures

Futures

- Margin
- Trading Order
- Futures Price
- Futures Products
- Normal and Inverted Market
- Hedging
- Basis Risk

Margin	★★★	性质、计算
Initial Margin	◘ Must be deposited when contract is initiated.	
Maintenance Margin	◘ When the balance in the margin account falls below the maintenance margin, broker executes a margin call. The next day, the investor needs to "top up" the margin account back to the initial margin level.	
Variation Margin	◘ Extra funds deposited after a margin call. ◘ Variation margin = initial margin – margin account balance	
Trading Order	**★★**	**性质**
Market Order	◘ At the best price available in the market.	
Limit Order	◘ At a particular price or at one more favorable.	
Stop Order	◘ Executed at the best available price once a bid or offer is made at a particular price or a less-favorable price.	
Stop-Limit Order	◘ Becomes a limit order as soon as a bid or offer is made at a price equal to or less favorable than the stop price.	

Futures Price	★★★	性质、计算
Principle	◻ Cost-of-carry model sets a futures price as a function of the spot price: the futures price equals the spot price compounded at the interest rate plus the storage cost less any income earned on the asset.	
Calculation	$F_0 = S_0 e^{rT}$ $F_0 = S_0 e^{(r+u-q-y)T}$ $\quad F_0 = (S_0 + U - I) e^{(r-y)T}$ $F_0 = S_0 e^{(r-q)T}$ $\quad F_0 = (S_0 - I) e^{rT}$	
Interest Rate Parity	$\text{Forward} = \text{Spot}\left(\frac{1+r_{DC}}{1+r_{FC}}\right)^T$ $\quad \text{Forward} = \text{Spot} \times e^{(r_{DC}-r_{FC})T}$	

Futures Products	★★★	性质、计算
S&P 500 Futures	◘ Index × $250 (multiplier of 250)	
Treasury Bond Futures	◘ **Face value:** $100,000	
	◘ Any government bond has more than 15 years to maturity on the first day of the delivery month and is not callable within 15 years can be delivered.	
	◘ **Cheapest-to-Deliver Bond:** Cost = quoted bond price – (QFP×CF)	
Eurodollar Futures	◘ **Face value:** $1 million	
	◘ **Three-month**	
	◘ **Value:** $P_t = 10{,}000 \times [100 - 0.25(100 - FQ_t)]$	
	◘ **DV01:** 1 bp up move in the futures quote corresponds to a gain of $25 per contract for long position.	
	◘ **Convexity Adjustment:** $\text{Forward Rate} = \text{Futures rate} - 0.5\sigma^2 T_1 T_2$	

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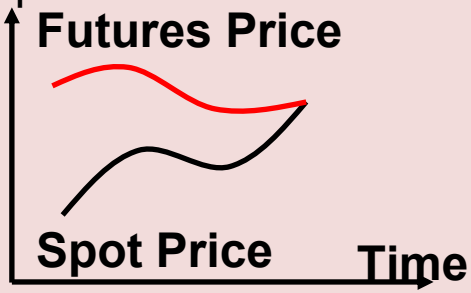
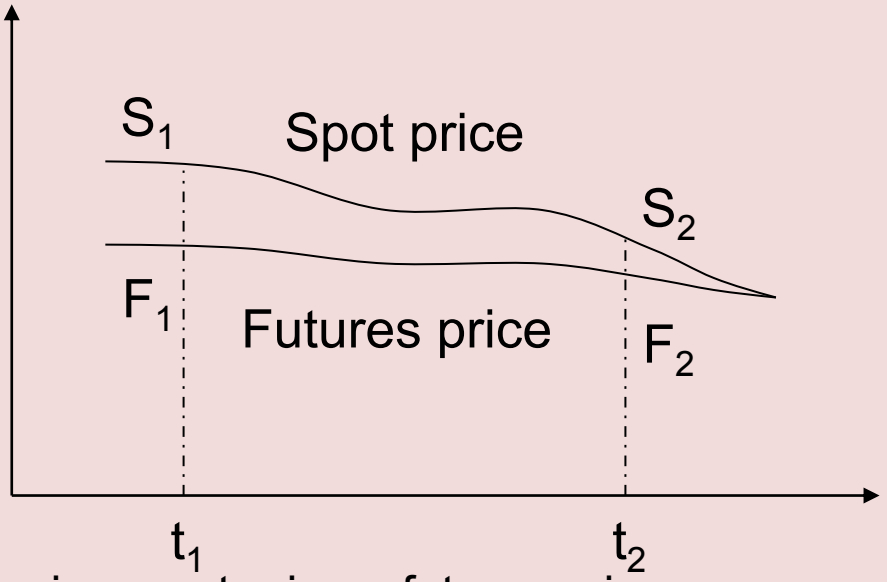
Normal and Inverted Market	★★★	性质
Contango (Normal)	▫ Forward price is higher than the spot price. ▫ The distant forward price is higher than the near forward price.	
Backwardation (Inverted)	▫ Forward price is less than the spot price. ▫ The distant forward price is less than the near forward price.	



Contango

Backwardation

Hedging	★★★	性质、计算	
Strip Hedge And Stack Hedge	◻ **Strip:** Buying futures contracts that match the maturity and quantity for every month of the obligation. ◻ **Stack:** Enter into a 1 month futures contract equaling the total value of the year’ s promised deliveries.		
Hedge Ratio	$HR = \rho_{S,F}\frac{\sigma_S}{\sigma_F}$	**Hedge Effectiveness**	R^2
Stock Index Futures Hedging	$\text{number of contracts} = \beta_{\text{portfolio}} \times \frac{\text{portfolio value}}{\text{value of futures contract}}$ $= \beta_{\text{portfolio}} \times \frac{\text{portfolio value}}{\text{futures price} \times \text{contract multiplier}}$ $\text{number of contracts} = (\beta^* - \beta) \times \frac{\text{portfolio value}}{\text{value of futures contract}}$		

Basis Risk	★★★	性质
Definition	◻ Difference between spot price and futures price. ◻ The change in basis is termed basis risk.	
	 ◻ Basis = spot price – futures price	
The hedging risk is known as basis risk.	◻ Different asset ◻ Different maturity	

Swap

Swap

- Comparative advantage
- Valuation
- Other Types of Swaps

Comparative advantage	★★★	性质、计算

Interest Rate Swap

- Most common type of swap is an interest rate swap.
- Some companies may have comparative advantage in fixed rate markets, while other companies have a comparative advantage in floating rate markets. When companies want to borrow, they look for cheap borrowing, i.e. from the market where they have comparative advantage. However, this may lead to a company borrowing fixed when it wants floating or borrowing floating when it wants fixed. This is where a swap comes in. A swap has the effect of transforming a fixed rate loan into a floating rate loan or vice versa.

Currency Swap

- The currency swaps are also motivated by comparative advantage.

Examples

	Fixed	Floating
ABC	4%	Libor + 1%
XYZ	6%	Libor + 2%

	USD Borrowing	GBP Borrowing
A	5%	7%
B	6%	7.5%

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Valuation	★★★	计算
Interest Rate Swap	**Principles:** □ If two companies enter into an interest rate swap arrangement, then one of the companies has a swap position that is equivalent to a long position in floating-rate bond and a short position in a fixed-rate bond. □ The value of a floating rate bond will be equal to the notional amount at any of its periodic settlement dates when the next payment is set to the market rate (floating).	
	Calculation: $V_{Swap} = B_{Float} - B_{Fixed}$ $V_{swap} = B_{Fixed} - B_{float}$	
Currency Swap	**Principle:** A currency swap involves exchanging principal and fixed rate interest payments on a loan in one currency for principal and fixed rate interest payments on an equal loan in another currency.	
	Calculation: $V_{Swap} = B_D - S_0B_F$ $V_{swap} = S_0B_F - B_D$	

Other Types of Swaps	★★	性质
Volatility Swap	◘ Involves the exchange of volatility based on a notional principal. One side of the swap pays based on a pre-specified fixed volatility while the other side pays based on realized volatility.	
Variance Swap	◘ Involves exchanging a pre-specified fixed variance rate for a realized variance rate. ◘ Variance swaps are easier to price and hedge since they can be replicated using a collection of call and put options.	
Equity Swap	◘ The return on a stock, a portfolio, or a stock index is paid each period by one party in return for a fixed-rate or floating-rate payment.	
Commodity swap	◘ Firms may enter into commodity swap agreements where they agree to pay a fixed rate for the multi-period delivery of a commodity and receive a corresponding floating rate based on the average commodity spot rates at the time of delivery.	

Option

Option

- Moneyness
- Intrinsic Value and Time Value
- Early Exercise
- Upper and Lower Bounds
- Put-Call Parity
- Trading Strategies involving Options
- Exotic Options

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

Intrinsic Value and Time Value	★★	性质

- **Intrinsic Value:** The amount that it is in the money, and zero otherwise
- **Time Value:** The difference between the price of an option (called its premium) and its intrinsic value is due to its time value

Early Exercise	★★★	性质
American Option	▫ it is never optimal to execute an early exercise on an **American call** option on a non-dividend paying stock. However, it can be optimal to execute an early exercise on an **American put.**	

Upper and Lower Bounds for Option Prices	★★★	性质、计算

Option	Min Value	Max Value
European Call	$\text{Max}(S_0 - Xe^{-rT}, 0)$	S_0
American Call	$\text{Max}(S_0 - Xe^{-rT}, 0)$	S_0
European Put	$\text{Max}(Xe^{-rT} - S_0, 0)$	Xe^{-rT}
American Put	$\text{Max}(X - S_0, 0)$	X

Put-Call Parity	★★★	性质、计算

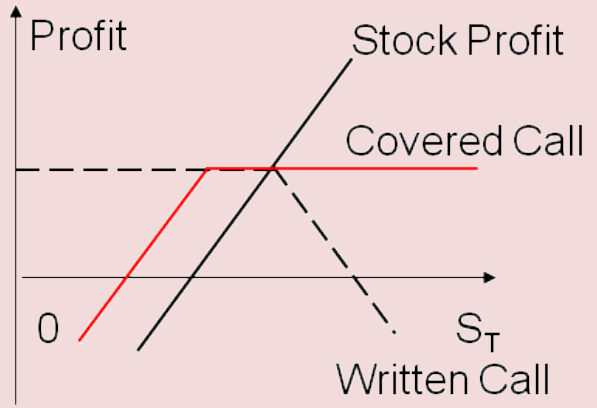
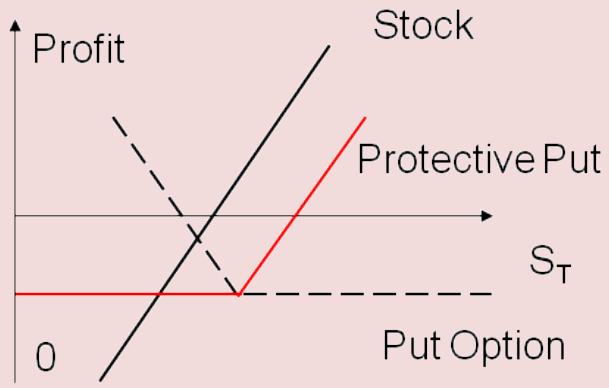
Calculation

$$C + Ke^{-rT} = p + S_0$$

$$p + S_0 = c + D + Xe^{-rT}$$

$$S - X \le C - P \le S - Xe^{-rT}$$

$$S_0 - X - D \le C - P \le S_0 - Xe^{-rT}$$

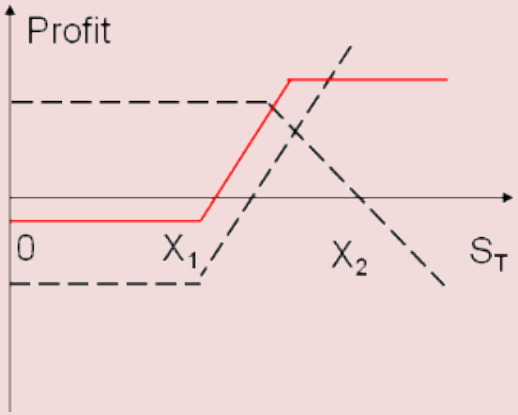
Trading Strategies involving Options	★★★	性质、计算
Simple Strategies	Covered Call	
	Protective Put	

Trading Strategies involving Options ★★★ 性质、计算

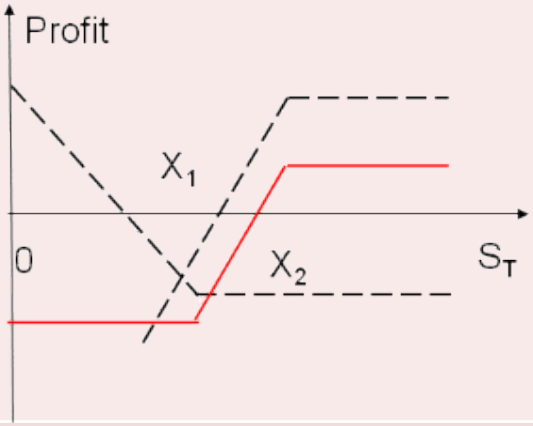
Spread Strategies

Bull Spread

Bull Call

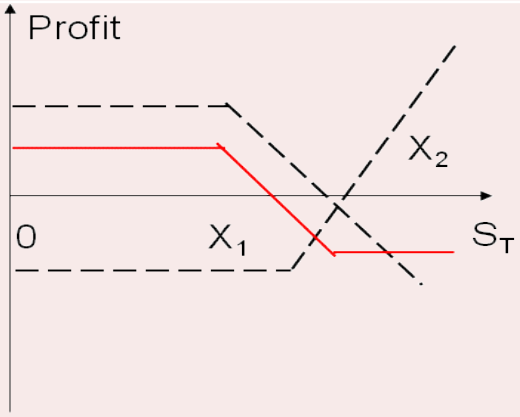


Bull Put

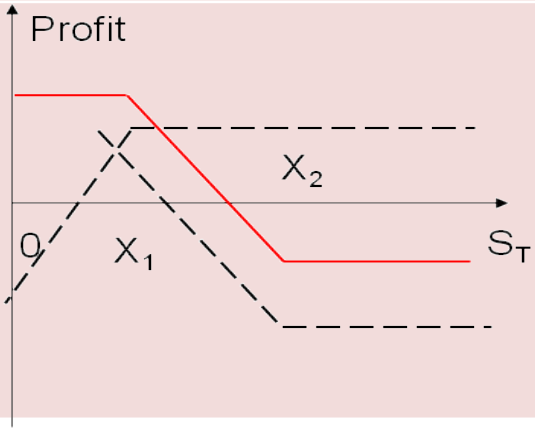


Bear Spread

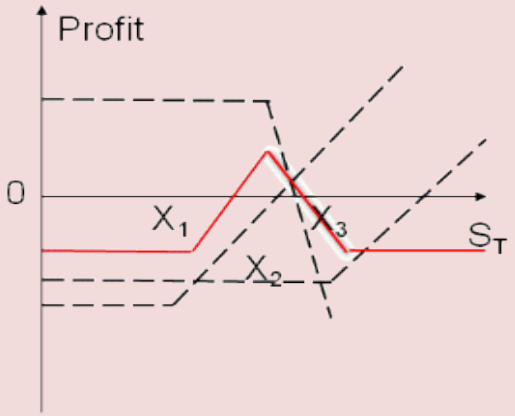
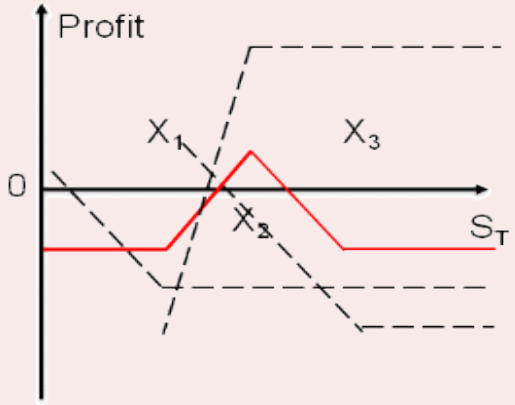
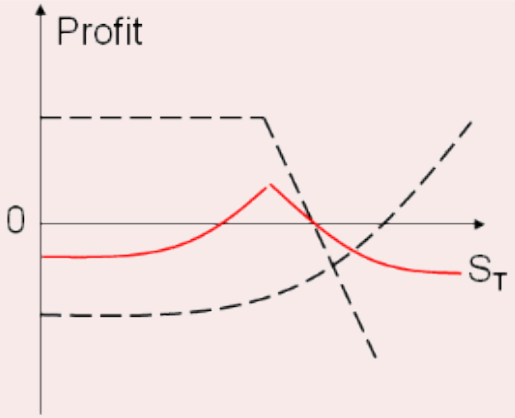
Bear Call



Bear Put



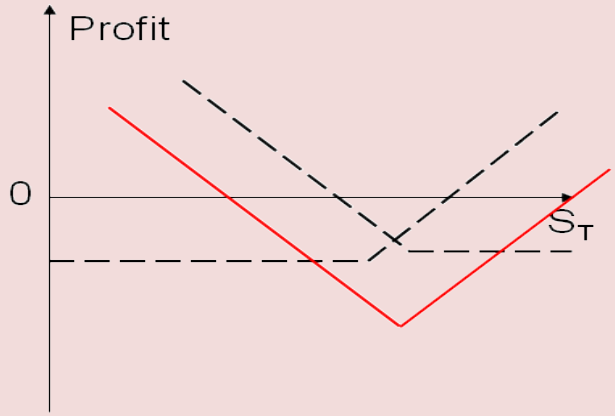
Trading Strategies involving Options	★★	性质、计算

		Call	Put
Spread Strategies	Butterfly Spread		
	Calendar Spread		

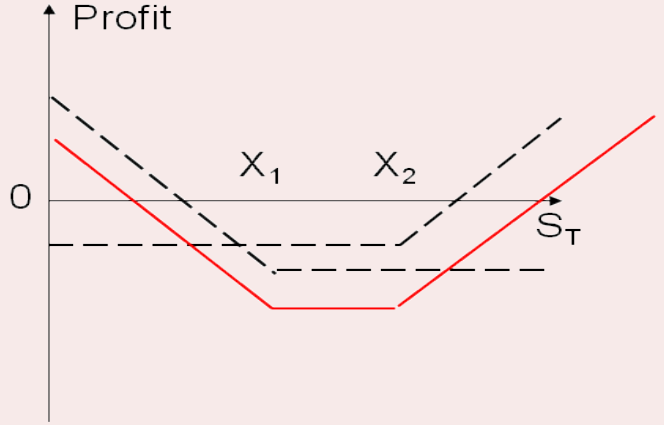
Trading Strategies involving Options ★★★ 性质、计算

Combination Strategies

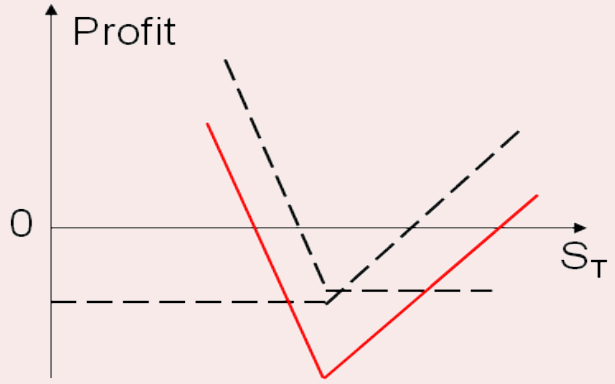
Straddle



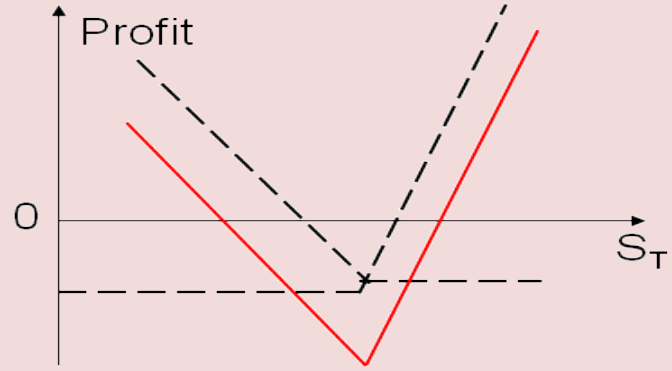
Strangle



Strip



Strap



Exotic Options	★★	性质
Bermudan	◘ Early exercise may be restricted to certain dates.	
Compound	◘ Options on options.	
Chooser	◘ After a specified period of time, the holder can choose whether the option is a call or a put.	
Shout	◘ The holder can "shout" to the writer at one time during its life. At the end of the life of the option, the option holder receives either the usual payoff from a European option of the intrinsic value at the time of the shout, whichever is greater.	
Asian	◘ Payoff depends on the arithmetic average of the price of the underlying asset during the life of the option. ◘ Average price call: $Max(S_{avg} - K, 0)$; average price put: $Max(K - S_{avg}, 0)$; average strike call: $Max(S_T - S_{avg}, 0)$; average strike put: $Max(S_{avg} - S_T, 0)$	

Exotic Options	★★★	性质、计算
Barrier	□ A knock-out option ceases to exist when the underlying asset price reaches a certain barrier while a knock-in option comes into existence only when the underlying asset price reaches a barrier. □ In-out parity: If we combine one "in" option and one "out" barrier option with the same strikes and expirations, we get the price of a vanilla option. □ Path-dependent.	
Binary	□ The cash-or-nothing binary option pays some fixed amount of cash if the option expires in-the-money.	$Qe^{-rT}N(d_2)$
	□ The asset-or-nothing pays the value of the underlying security.	$S_0e^{-qT}N(d_1)$
Lookback	□ Payoff depends on the maximum or minimum price of the underlying asset. Two kinds: floating and fixed strike.	