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Derivatives

CFA一级知识框架图

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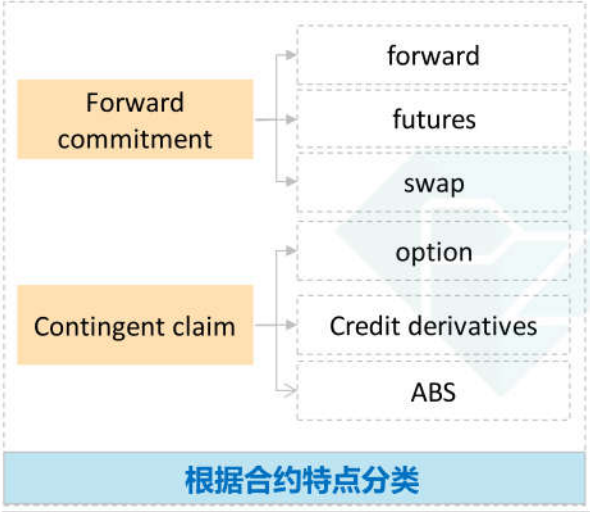
DERIVATIVE MARKETS AND INSTRUMENTS

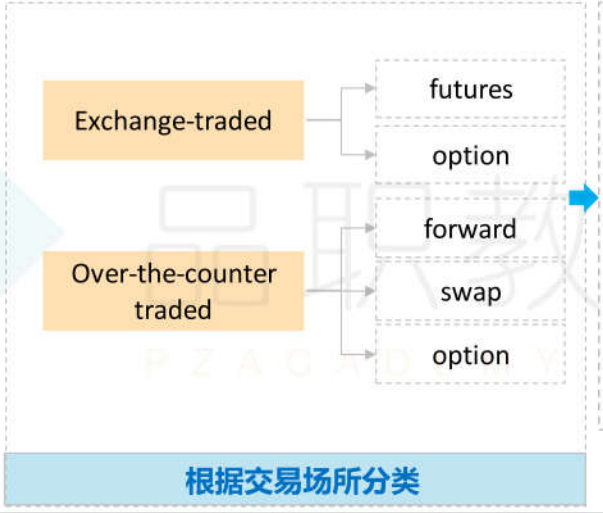
Basic Concept

定义 概念，针对未来交易，回避风险

衍生品分类方法★



根据合约特点分类



根据交易场所分类

衍生品优缺点★ 概念

- Purposes
  - Risk management
  - Information discovery
  - Operational advantages
  - Market efficiency
- Controversies
  - Speculation and gambling
  - Destabilization and systemic risk

Exchange-traded	Over-the-counter
Standardized→ Liquid	Customized→ Specific needs
Regulated	Unregulated
Backed by a clearinghouse (No default)	Trade with counterparty (default risk)
Trade in a physical exchange	not trade in organized markets → with dealer

四种常见衍生品

Forward 概念

Definition

分类 → Commodity forward contract / Financial forward contract

Purposes of trading → Hedge risk / Speculation

交割★ → at expiration → Physical settlement / Cash settlement

交割★ → prior to expiration → Offsetting

FRA

基本概念

LIBOR
Euribor
EuroDollar
FRAs

FRA定义★ → long position→Borrow; Short position→lend

FRA期限

报价★ Example 3×9FRA Payoff计算★★

概念

FRA获得 → Real FRA / Synthetic FRA ★

Futures

Forwards	Futures
Private contracts	Exchange-traded
Unique customized contracts	Standardized contracts
Little or no regulation	Regulated
Default risk is present	Guaranteed by clearinghouse
Settlement at maturity	Daily settlement (mark to market)
No margin deposit required	Margin required and adjusted

与Forward区别★★

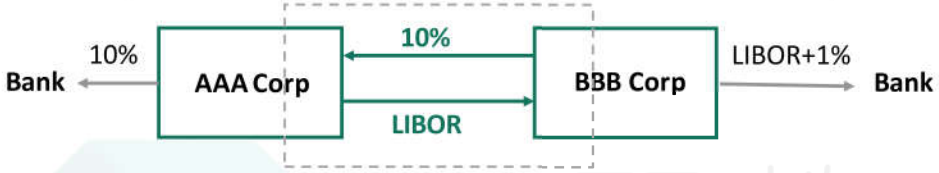
Futures不会违约原因

Futures contract风险控制方法★★

风控方法	考点
Margin	1. Initial margin 2. Maintenance margin 3. Variation margin 回到IM 计算，与Equity区别
Daily Price Limit	Limit move Locked limit 概念
Marking to market	盯市方法→FP converges to SP at termination→Payoff = $S_T(T) - F_0(T) = F_T(T) - F_0(T)$

Swap

与Forward相似点 → 代表 Interest Rate Swaps



Option

- 概念
  - Option定义
    - Call option / Put option
    - American option / European option
  - 价格
    - option premium
    - Strike price
  - Moneyness：定性看long是否赚钱
  - Intrinsic Value：定量看long赚多少钱
    - C=max[0, S-X]
    - P=max[0, X-S]
  - Option value=intrinsic value + time value

Credit Derivatives

- Total Return Swap
- Credit Spread Option
- Credit-linked Note
- Credit Default Swaps

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BASICS OF DERIVATIVE PRICING AND VALUATION

Pricing and Valuation

price → 原理 → no-arbitrage principle → Cash-and-Carry Arbitrage ★ / Reverse Cash-and-Carry Arbitrage ★ → Asset + Derivative = Risk-free asset

Limits to Arbitrage

Replication

↓ Price vs. Value ★★

Contract	T=0→Price	T=t→ Value
T-bill forwards	$FP = S_0 \times (1+R_f)^T$	$V_{long} = S_t - \frac{FP}{(1+R_f)^{T-t}}$
dividend-paying stock (Coupon Bond)	$FP = (S_0 - PVD_0) \times (1+R_f)^T$	$V_{long} = S_t - PVD_t - \frac{FP}{(1+R_f)^{T-t}}$

定性掌握 → Futures与Forward估值区别★ → ρ(FP,rf) / Investors will...

ρ(FP,rf)	Investors will...
Positive	Futures price > forward contract.
Zero	Futures price = forward contract.
Negative	Futures price < forward contract.

swap contract→ 求swap rate

- Equivalence of swaps to bonds
- Equivalence of swaps to FRA
- Equivalence of swaps to Options

Option Pricing★ ★

方法1：binomial model

$$\pi_u = \frac{1 + R_f - d}{u - d}$$

value of an option: $c = \left[\pi_u C_1^+ + \pi_d C_1^-\right] \times \frac{1}{(1 + R_f)^T}$

方法2：Put call parity

$$c + X/(1 + R_f)^T = S + p$$

或$c + K/(1 + R_f)^T = S + p$

$F_0/(1 + r)^T + p_0 = c_0 + X/(1 + r)^T$

方法3：最小值

$c_0 \geq Max[0, S_0 - X/(1 + r)^T]$

$p_0 \geq Max[0, X/(1 + r)^T - S_0]$

⬇ Factors affect the value of an option★ ★

Sensitivity Factor	Calls	Puts
Underlying price	Positively related	Negatively related
Volatility	Positively related	Positively related
Risk-free rate	Positively related	Negatively related
Time to expiration	Positively related	Positively related* →
Strike price	Negatively related	Positively related
Payments on the underlying	Negatively related	Positively related
Carrying cost	Positively related	Negatively related

European put 特殊


Thank
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