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Derivative

2015CFA一级知识框架图

Framework

总体框架（今年CFA I Derivative变化较大，将部分二级内容移到一级）

- Derivative概念(R57)
  - Forward → Futures → Swap
  - Option
- Derivative定价与估值（R58）
  - 无套利定价法则 → Forward、Futures & Swap
  - 二叉树定价法则 → Option
- Risk Management（R59）

Reading 57

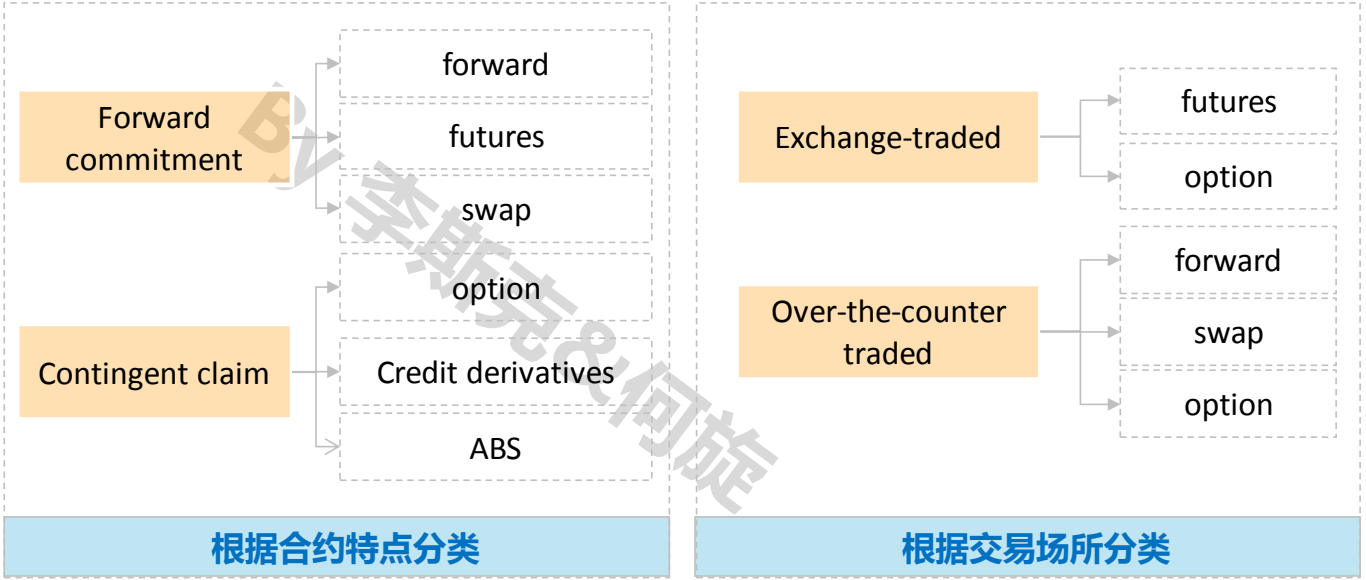
Derivative markets and instruments

Basic Concept

Derivative基本概念

定义 概念，针对未来交易，回避风险

衍生品分类方法★



衍生品优缺点★ 概念

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
- **prior to expiration** ➡ Offsetting

代表合约

FRA

基本概念

LIBOR
Euribor
EuroDollar
FRAs

概念

FRA定义★

long position→Borrow
Short position→lend

FRA期限

报价★ Example 3×9FRA Payoff计算★★

FRA获得

Real FRA

Synthetic FRA ★

Futures

与Forward区别 ★★

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

Futures不会违约原因

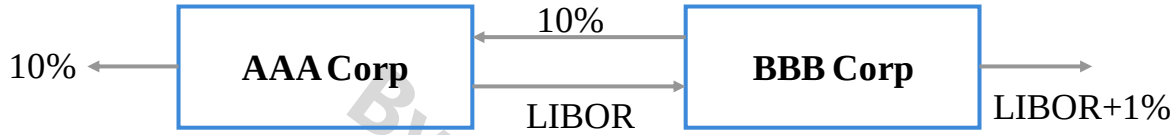
Futures contract风险控制方法★★

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 概念

Swap

代表

与Forward相似点 → Interest Rate Swaps



Option

概念

- **Option定义**
  - Call option
  - Put 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

计算

Put call parity

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

或$$c + K/(1+R_f)^T = S + p$$

最大最小值

Option	Min Value	Max Value
European call	$Max[0, S_t - X/(1+R_f)^{T-t}]$	S_t
American call	$Max[0, S_t - X/(1+R_f)^{T-t}]$	S_t
European put	$Max[0, X/(1+R_f)^{T-t} - S_t]$	$X/(1+R_f)^{T-t}$
American put	$P_t \geq Max[0, X - S_t]$	X

不分红美式看涨期权不会提前执行

Reading 58

Basics of Derivative Pricing and Valuation

price → 原理 → no-arbitrage principle

Limits to Arbitrage

- Cash-and-Carry Arbitrage ★
- Reverse Cash-and-Carry Arbitrage ★

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★

swap contract→ 求swap rate

Replication → Asset + Derivative = Risk-free asset

Option Pricing → binomial model

★★

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

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

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

Reading 59

Risk management applications of option strategies

如何用option控制风险

	Covered Call	Protective Put
构成★	Covered call=S－C	Protective put=S+P
相似头寸	Short put	Long call
极致收益★	Max Gain=X-S0+C	Max Loss=X-S0-P
Breakeven`	St=S0-C	St=S0+P

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