



CFA Pre-Courses

Derivatives

Instructor: Angel

01 First insight to derivatives

02 Forwards

03 Futures

04 Option

05 Swap



First Insight to Derivatives

What is derivative ?

Characteristics and Function





大神，
除了投资，可有爱好？

喝一杯星巴克

知道星巴克
和供应商担心什么吗？



First Insight to Derivatives



担心**未来**阿拉比卡
咖啡豆**涨价**

担心**未来**阿拉比卡
咖啡豆**跌价**



是否可以锁定
未来的成交价格？

签订远期合约
Forward contract



Derivatives (衍生品)

- ✓ A derivative is a financial instrument that derives its performance from the performance of an **underlying asset** (标的资产).



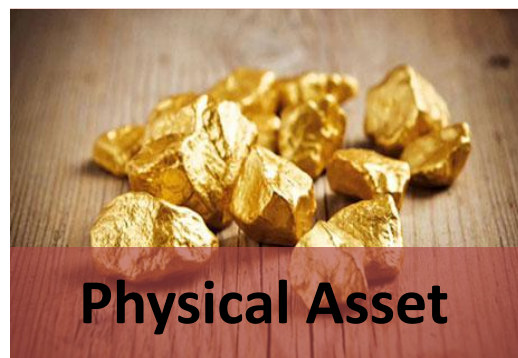
Derivatives

- ✓ The underlying asset, or underlying, trades in the cash or spot markets (现货市场) and its price is called the cash or spot price (现货价格).



Financial Asset

Equity
Fixed-income security
Currency



Physical Asset

Commodity



Other

Interest rate
Credit
Weather
Other derivatives

First Insight to Derivatives

Forward commitment (远期契约)

- ✓ Provide the ability to lock in a price at which one might buy or sell the underlying.
- ✓ Force the two parties to transact in the future at a previously agreed-on price.
- **Forward, futures, and swap**

Derivatives

Contingent claim (或有索取权)

- ✓ Provide the right but not the obligation to buy or sell the underlying at a predetermined price.
- ✓ The choice of buying or selling versus doing nothing depends on a particular random outcome.
- **Option**

First Insight to Derivatives

What is derivative ?

Characteristics and Function



Characteristics and Function

Characteristic

特点

零和博弈

杠杆效应

定价复杂

Function

作用

套期保值

杠杆投机

绕过监管

Derivatives in CFA

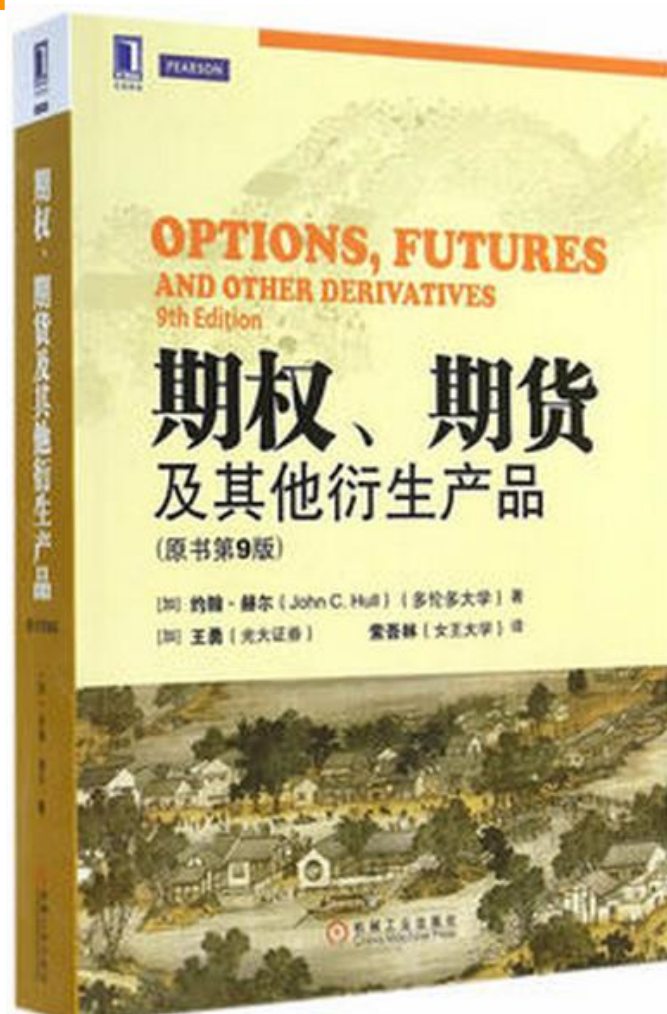
➤ Topics in CFA curriculum:

Ethics & Professional Standards	
Investment Tools	Quantitative Methods (QM)
	Economics
	Financial Reporting & Analysis
	Corporate Finance
Asset Classes	Equity Investment
	Fixed Income
	Derivatives
	Alternative Investments
Portfolio Management & Wealth Planning	



Recommendation for Derivatives

- 作者: (加) [赫尔](#)
- 出版社: [机械工业出版社](#)
- 出版时间: 2014年11月
- 针对当前金融问题, 建立了实务和理论的桥梁, 并且尽量少的采用数学知识, 提供了大量业界事例, 主要讲述了期货市场的运作机制、采用期货的对冲策略、远期及期货价格的确定、期权市场的运作过程、雇员股票期权的性质、期权交易策略以及信用衍生产品、布莱克斯科尔斯默顿模型、希腊值及其运用等



Forward

Tasks:

- **Describe** the characteristics of forward
- **Identified** forward at initiation and settlement



Forwards

- ✓ An **over-the-counter** derivative **contract** in which two parties engaged.
- ✓ The **buyer**, will purchase an underlying asset from the **seller at a later date at a fixed price** they agree on when the contract is signed.

远期合约的这种交易方式是相对于即期交易而言。

- ✓ **即期**交易交易双方对**现在**时间的交易达成协议，并现在就货款交割；
- ✓ **远期**交易是交易双方对**未来**时间的交易达成协议，协议是现在定下来，但合约履行、货款交割是在未来时刻。



Forwards



Buyer
Long position



Seller
Short position

TODAY

JAN.

FEB.

MAR.

APR.

EXPIRATION
MAY

Starbucks and Planters assigned the forward contract.

No payment made at the initiation of forward contract.

Execution/
Settlement

At the Initiation

Underlying: 阿拉比卡咖啡豆

Forward price: 145美分/磅

Identity: 哥伦比亚supremo

Quantity: 10,000磅

At Settlement

Delivery 实物交割

OR

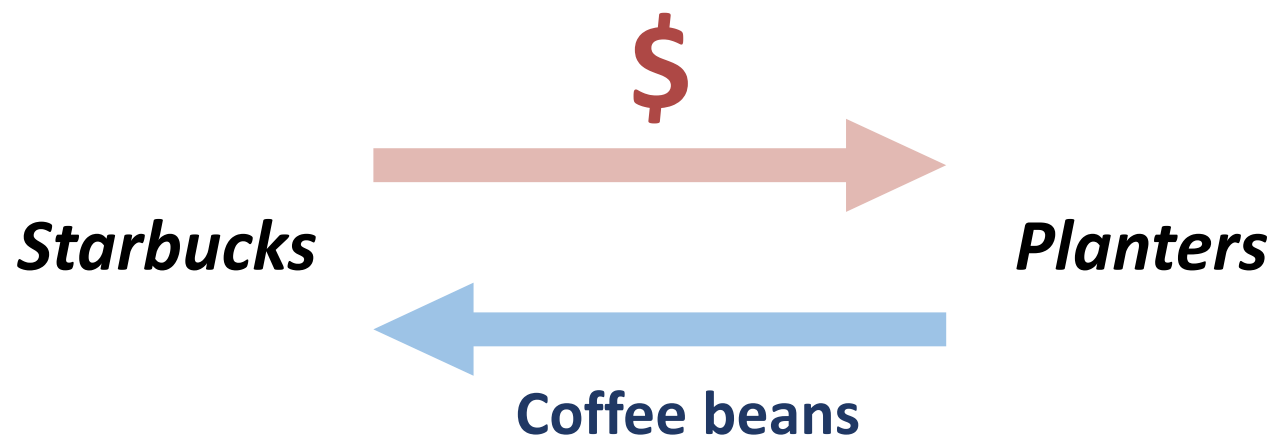
Cash settlement 现金交割

Forward price: The fixed price at which the underlying will be exchanged at a later date.



Settlement

- Settling a forward at the expiration date
 - ✓ Delivery : The long (多方) will pay the agreed-upon price to the short (空方) , who in turn will deliver the underlying asset to the long.



Settlement

- ✓ Cash settlement: Permits the long and short to pay the **net cash** value of the position on the delivery date. Cash-settled forward contracts are sometimes called NDFs, for non-deliverable forwards.



Settlement

- ✓ Long gains if asset price above forward price.
- ✓ Short gains if asset price below forward price.

BUT If price goes above forward price at the settlement, the seller is likely to

Default!!!




Futures

Tasks:

- Compare and contrast forward and futures
- Describe initial margin, maintenance margin
- Describe hedge in the futures





存在没有违约风险的
投资品么？

场内交易的没有违约风险，
例如Futures



Forward vs Futures

Over-the-counter Derivatives

场外衍生品
Forwards

Customized, flexible, and more private and less regulated than exchange-traded derivatives.

Subject to a greater risk of default.

- Over-the-counter market is a decentralized market where buy and sell orders initiated from various locations are matched through a communications network.



Exchange-traded Derivatives

场内衍生品
Futures

Standardized, highly regulated, and transparent transactions.

Guaranteed against default through the clearinghouse of the derivatives exchange.

- Clearinghouse(清算所)
- Settlement (结算)
- Margin/performance bond(保证金)



Futures contract (期货合约)

- Futures contracts are **standardized** instruments that trade on a futures **exchange**, have a secondary market, and are guaranteed against default by means of a **daily settling** of gains and losses.

Futures	Forward
Standardized contract Exchanged-traded Guarantee by clearinghouse Regulated Daily settlement	Customized contract OTC-traded Default risk Little or no regulated Settlement at expiration



Coffee Futures Contract Specs. (标准化合约)

Underlying	→	Coffee "C"
Contract Unit	→	37,500 pounds
Price Quotation	→	U.S. Dollars per pound
Minimum Price Fluctuation	→	\$0.0005 per pound
Product Code	→	CME Globex: KT; CME ClearPort: KT Clearing: KT
Trading Hour	→	Sunday - Friday 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. Chicago Time/CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT)



Futures

➤ Margin (保证金: 杠杆效应)

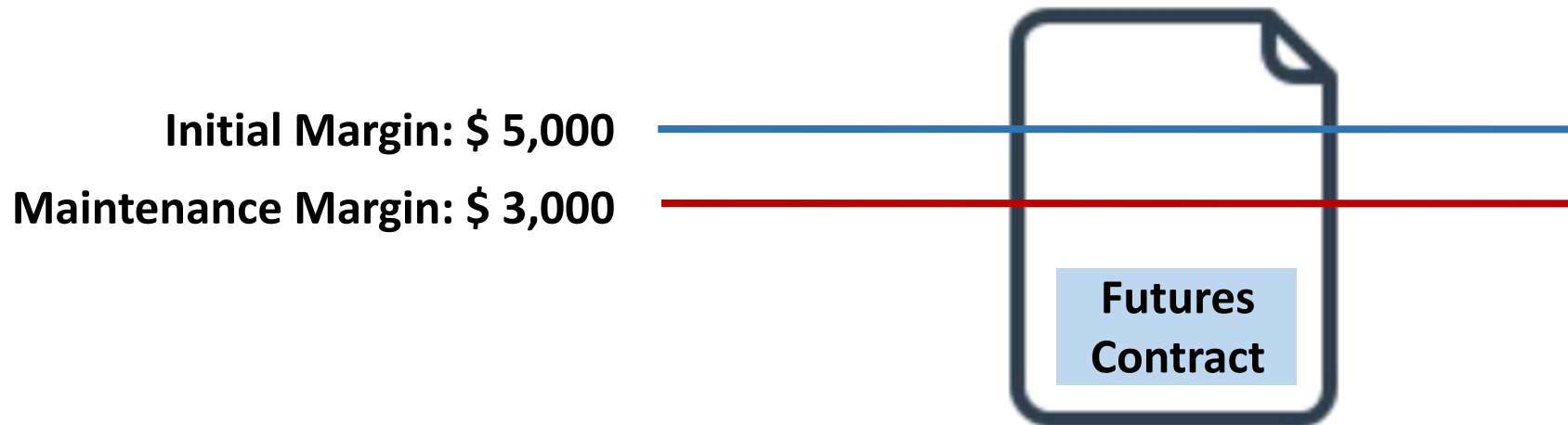


✓ Initial margin (初始保证金)

The amount of money in a margin account on the day of a transaction.

Futures

➤ Margin (保证金)



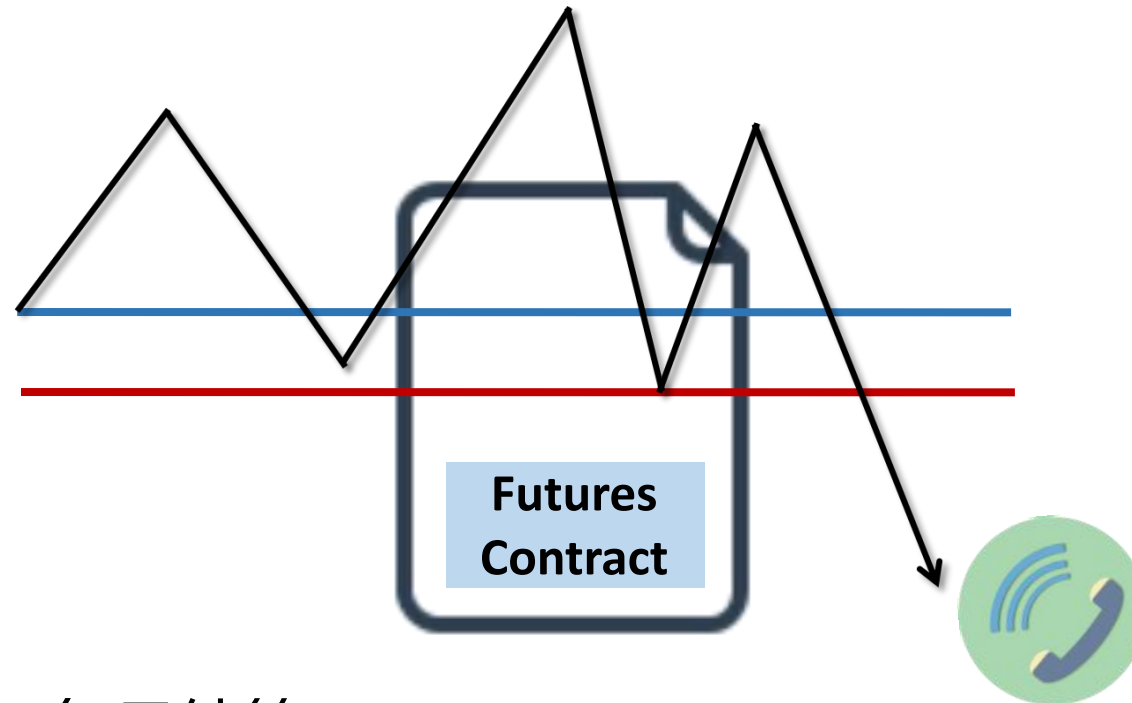
✓ Maintenance margin (维持保证金、最低保证金)

The amount of money that each participant must maintain in the account after the trade is initiated.

Futures

➤ Margin (保证金)

Initial Margin: \$ 5,000
Maintenance Margin: \$ 3,000



- ✓ Daily settlement (每日结算 **Marking to Market**)
 - A daily settlement of gains and losses.
 - Gains and losses : Difference between settlement price and futures price.

Futures

➤ Margin (保证金)

✓ Margin call (追加保证金)

- A request for the short to deposit additional funds to bring their balance **up to the initial margin**.



Futures

➤ 交易特征



金融期货 实例 ---- 沪深300指数期货合约

合约标的	沪深300指数
合约乘数	每点300元
报价单位	指数点
最小变动价位	0.2点
合约月份	当月、下月及随后两个季月
交易时间	上午：9:30-11:30，下午：13:00-15:00
每日价格最大波动限制	上一个交易日结算价的 $\pm 10\%$
最低交易保证金	合约价值的8%
最后交易日	合约到期月份的第三个周五，遇国家法定假日顺延
交割日期	同最后交易日
交割方式	现金交割
交易代码	IF
上市交易所	中国金融期货交易所



系统 功能 报价 分析 扩展市场行情 资讯 工具 帮助								证券交易未登录 中金所期货					
代码	名称	涨幅%	现价	买价	卖价	现量	涨跌%	买量	卖量	涨跌	总量	总金额	
1	IC1610	中证1610	-0.30	6279.0	6279.0	6279.4	1	-0.06	4	1	-19.0	4053	50.9亿
2	IC1611	中证1611	-0.30	6187.8	6187.4	6189.8	1	-0.00	3	1	-18.6	143	1.77亿
3	IC1612	中证1612	-0.21	6111.6	6109.8	6111.8	1	-0.05	1	1	-12.6	459	5.61亿
4	IC1703	中证1703	-0.25	5881.0	5879.2	5884.4	1	0.02	1	1	-15.0	137	1.61亿
5	IC500	中证500	-0.32	6350.10	-	-	0	0.01	153	298	-20.48	3165万	354.2亿
6	ICL8	中证主力	-0.30	6279.0	6279.0	6279.4	1	-0.06	4	1	-19.0	4053	50.9亿
1610	沪深1610	-0.61	3231.2	6199.4	3231.6	1	-0.05	9	4	-20.6	4792	59.9亿	
1611	沪深1611	-0.59	3202.0	3203.8	3179.4	1	0.04	1	1	-19.0	166	1.59亿	
1612	沪深1612	-0.48	3178.4	3109.0	3109.0	1	0.05	1	1	-15.2	41	3816万	
1703	沪深1703	-0.49	3109.8	-	0	0.04	66	207	-20.56	2754万	312.3亿		
13	IFL0	沪深当月	-0.61	3231.2	3231.2	3231.6	1	-0.01	3	1	-19.8	4013	38.9亿
14	IFL1	沪深下月	-0.59	3202.0	3201.8	3203.8	1	0.04	1	1	-19.0	166	1.59亿
15	IFL2	沪深下季	-0.48	3178.4	3178.0	3179.4	1	0.11	2	1	-15.2	310	2.95亿
16	IFL3	沪深隔季	-0.49	3109.8	3108.0	3109.0	1	0.05	1	1	-15.2	41	3816万
17	IFL8	沪深主力	-0.61	3231.2	3231.2	3231.6	1	-0.01	3	1	-19.8	4013	38.9亿
18	IFL9	沪深加权	-0.58	3213.8	3213.6	3214.2	1	0.02	7	4	-18.8	4530	43.8亿
19	IH1610	上证1610	-0.52	2175.6	2175.4	2176.0	2	0.04	1	5	-11.4	1816	11.8亿
20	IH1611	上证1611	-0.56	2166.8	2165.0	2167.8	1	0.04	1	1	-12.2	69	4481万
21	IH1612	上证1612	-0.48	2157.8	2156.0	2157.8	1	0.00	1	1	-10.4	178	1.15亿
22	IH1703	上证1703	-0.51	2132.4	2131.2	2133.0	1	0.03	2	1	-11.0	36	2301万
23	IH50	上证50	-0.60	2183.22	-	-	0	0.05	6	39	-13.07	612.0万	59.0亿
24	IHL8	上证主力	-0.52	2175.6	2175.4	2176.0	2	0.04	1	5	-11.4	1816	11.8亿
25	IHL9	上证加权	-0.51	2168.8	2168.2	2169.2	2	0.03	5	8	-11.2	2099	13.7亿
26	T1612	长债1612	0.09	101.215	101.210	101.215	3	-0.01	4	4	0.095	7397	74.9亿
27	T1703	长债1703	0.07	100.815	100.810	100.830	1	-0.01	5	4	0.075	300	3.02亿
分类▲ A股 中小 创业 B股 基金▲ 债券▲ 股转▲ 自选 板块▲ 自定▲ 港股▲ 期货▲ 港股通 股票期权 其它▲													
上证指数 3016.31 -17.59 -0.58% 691.9亿 沪深3254.97 -20.70 -0.63% 312.5亿 创业板 2159.85 3.34 0.15% 316.7亿 国金上海电信 7.22													

IF1610

2016年10月到期的
沪深300股指期货合约

合约月份

当月 下月 随后两个季月
10月 11月 12月 3月

现价3231.2点

一张合约的价格
= 合约乘数×点数
= 300 × 3231.2
= 969360元

保证金

969360 × 8% = 77548.8元

期货有什么用？

风险管理，套期保值



Hedge (套期保值)

- 以回避现货价格风险为目的的期货交易行为。
 - ✓ 商品价格风险，股票价格风险等。
- Taking a position in one market to offset and balance against the risk adopted by assuming a position in a contrary or opposing market or investment.



Hedge 例题 ---- 使用沪深300股指期货合约对冲股票风险

2018年1月，投资者手里**持有10万股股票A**，每股9元，市值90万元。准备在3月中旬分得股息后卖出。

但此时沪深300指数已经涨到3200点，投资者担心股票上涨过快后会发生急跌，手里持有的股票现货有价格下跌的风险。

为了对冲风险，投资者选择在3300点**卖出一张IF1803合约**，需缴纳保证金： $300 \times 3300 \times 8\% = 79,200$ 元

Jan.1 2018

JAN.

FEB.

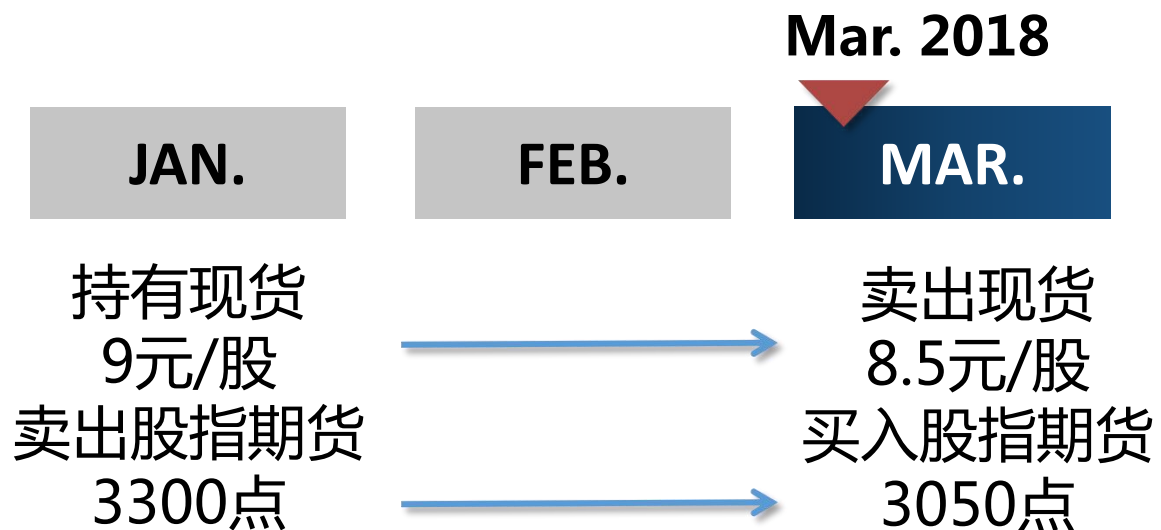
MAR.

持有现货 9元/股
卖出股指期货 3300点

Hedge 例题 ---- 使用沪深300股指期货合约对冲股票风险

到了**3月份**，沪深300指数跌至3100点。此时IF1803合约3050点。
股票价格跌至8.5元。

此时投资者卖出手里的股票，同时买入一张IF1803合约平仓。



Hedge 例题 ---- 使用沪深300股指期货合约对冲股票风险

在股指期货市场赚取 $(3300 - 3050) \times 300 = 75,000$ 元

在股票市场亏损 $(9 - 8.5) \times 100,000 = 50,000$ 元

不进行套期保值，直接亏损 50,000 元

套期保值后，赚取 25,000 元



Option

Tasks:

- **Classify** call/put option in long/short position
- **Describe** the moneyness





远期和期货是权利和义
务对等的产品

也有权利和义务不对等
的产品



01 First insight to derivatives

02 Forward

03 Futures

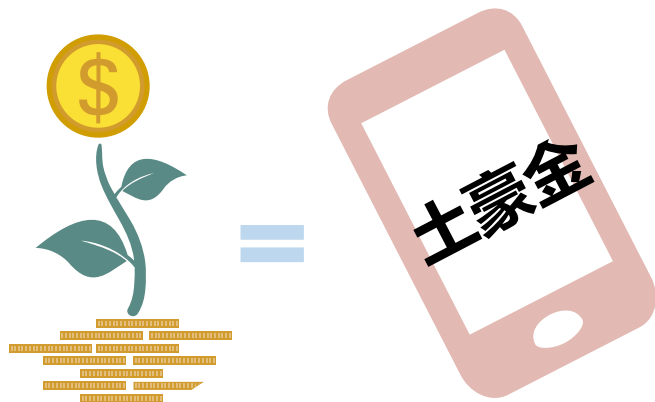
04 Option

05 Swap

17世纪荷兰的郁金香的市场

郁金香是贵族社会身份的象征

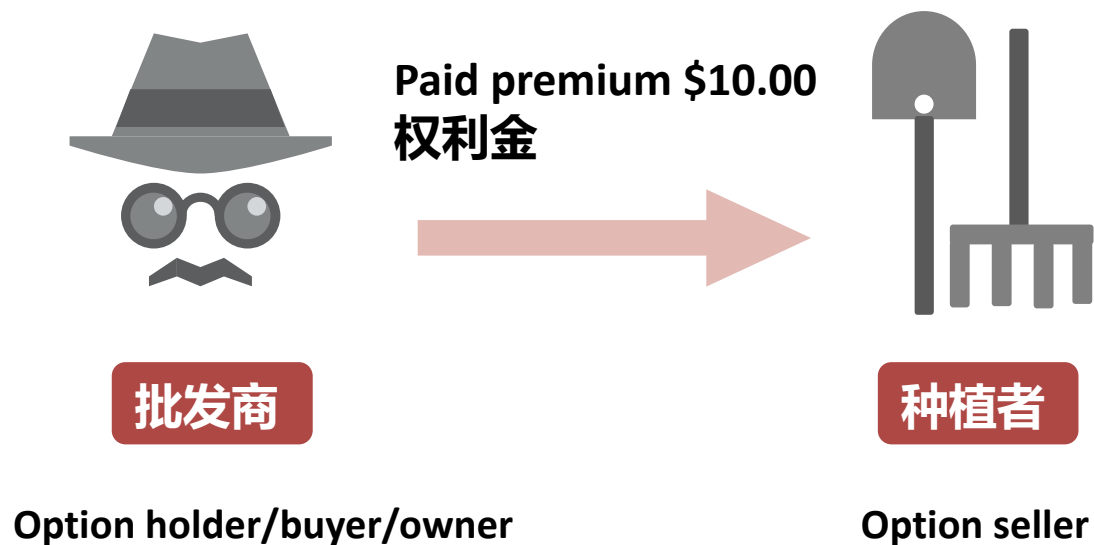
生长受到天气变化的影响极大



供不应求，零售价格快速上涨



17世纪荷兰的郁金香的市场



Call option
看涨期权

约定6个月后郁金香
的收购价为\$50.00

Call option
看涨期权

约定6个月后郁金香
的收购价为\$50.00

- **Strike price (执行价格):** The fixed price at which the option holder can buy or sell the underlying is called **the exercise price, strike price, striking price, or strike.**
- **Exercise (行权):** The use of this right to buy or sell the underlying is referred to as exercise or exercising the option.

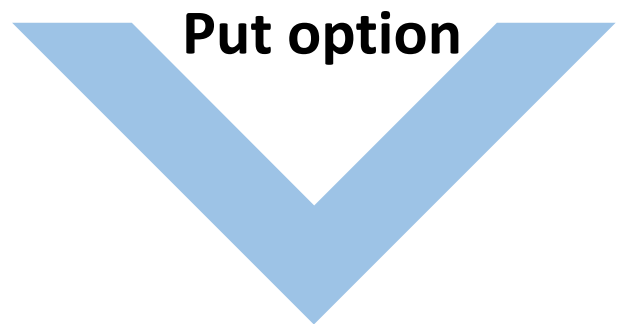
Definition

- A contract which gives the buyer (the owner or holder) the right, but not the obligation, to buy or sell an underlying asset or instrument at a specified price on or before a specified date, depending on the form of the option.
- 或有权利：支付权利金(Premium)的一方获得权利，可选择是否执行该权利。收取期权费的一方有义务执行合同约定内容。权利义务不对等。



看涨期权

A call is an option granting the **right to buy** the underlying.



看跌期权

A put is an option granting the **right to sell** the underlying.



Option

Call option



BUYER of Call Option has the right to buy an underlying

Call option



SELLER of Call Option has the obligation to sell an underlying

Put option

BUYER of Put Option has the right to sell an underlying

Put option

SELLER of Put Option has the obligation to buy an underlying



BUY OPTION

SELL OPTION

Option Market: OTC or Exchange

Expiration



郁金香合约价\$50.0

郁金香市场价格走势

—



Market price < Exercise price



Buyer of call option : 不行权 , 损失期权费



Expiration



郁金香合约价\$50.0

郁金香市场价格走势

Market price > Exercise price



Buyer of call option : 行权 , 按行权价购买, 有违约风险

Moneyiness

	Call option	Put option
实值期权 In the money	$S > X$	$S < X$
虚值期权 Out of the money	$S < X$	$S > X$
平值期权 At the Money	$S = X$	$S = X$

(S: market price ; X: exercise price)



Classification by Exercise Date(行权时间)

➤ European option(欧式期权)

May be exercised only at the expiration date of the option

➤ American option(美式期权)

May be exercised at any time before the expiration date

➤ Bermudan option (百慕大期权)

Can be exercised only on specific dates listed in the terms of the contract .



Swap

Tasks:

- Explain the swap process



Definition

- Swaps (互换合约) are over-the-counter contracts in which two parties agree to exchange a series of cash flows with each other.
- The most common swap is the fixed-for-floating interest rate swap (利率互换合约) or plain vanilla swap.
 - ✓ The underlying is interest rate.



Swap

Interest Rate Swap

Jan. 1st 2016

Floating interest rate

=

Variable base interest
(LIBOR)

+

Margin (2%)

Bank



Lender

Floating Interest payment annually



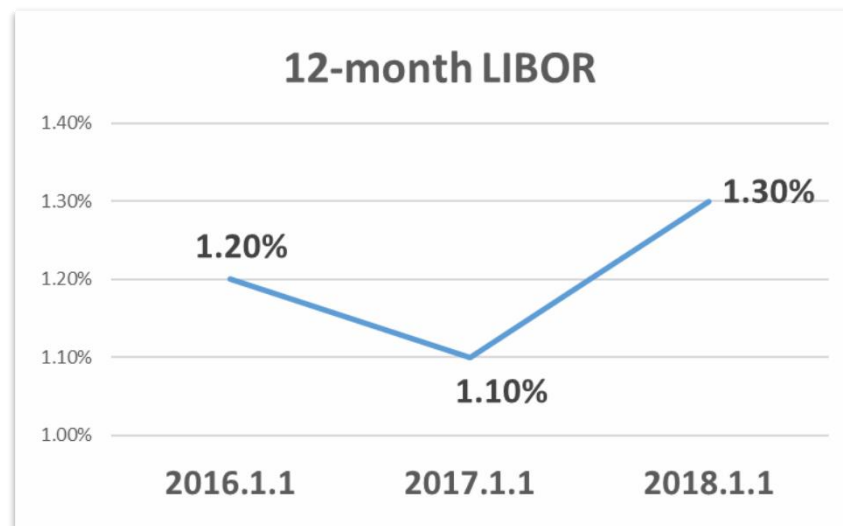
Borrower



Lend \$1,000,000
for 2 years

Interest Rate Swap

Floating interest rate
=
Variable base interest (LIBOR)
+
Margin (2%)



2016.1.1

2017.1.1

2018.1.1

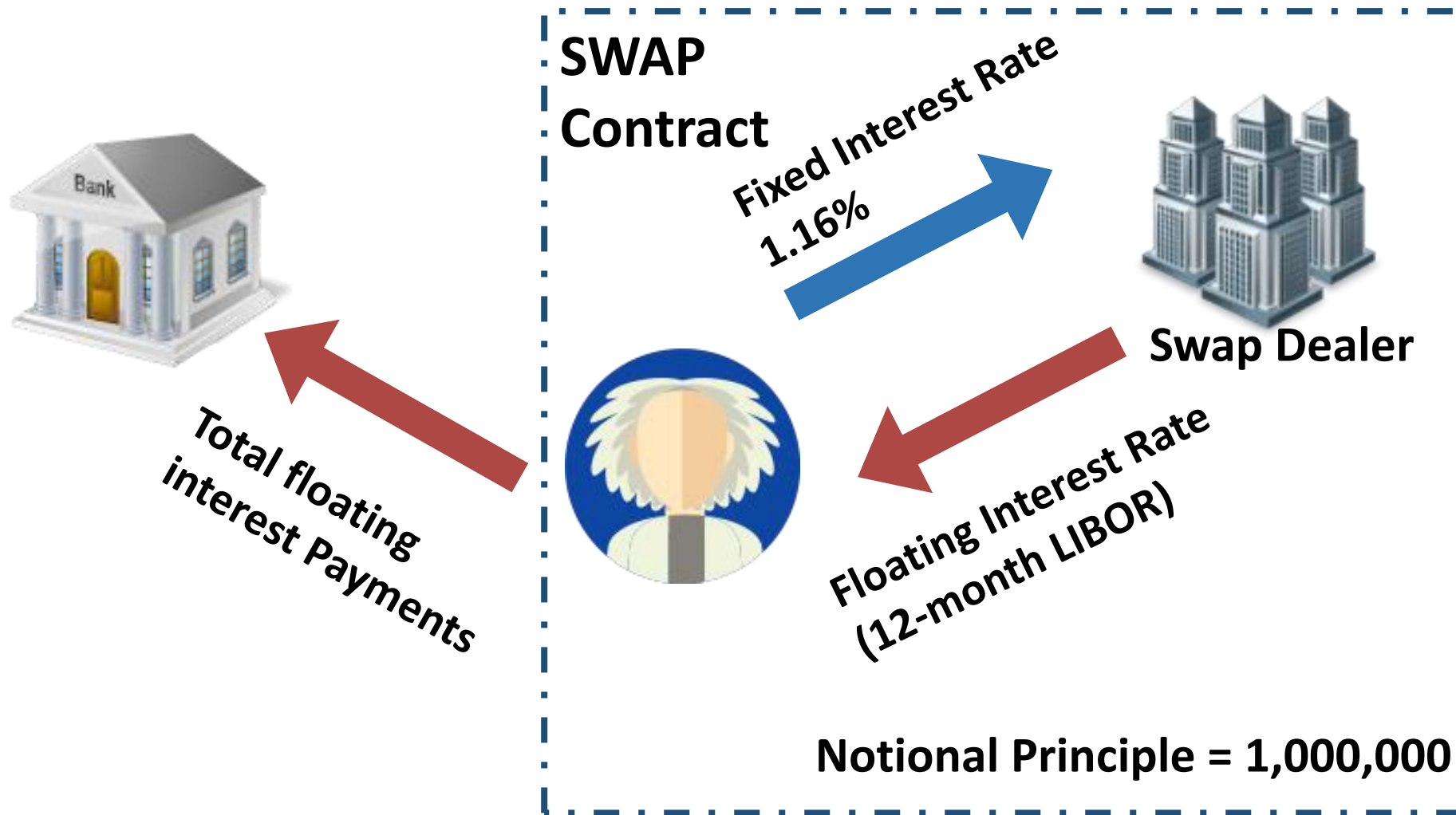
Interest

$1,000,000 \times (2\% + 1.2\%)$
= 32,000

Interest

$1,000,000 \times (2\% + 1.1\%)$
= 31,000

Interest Rate Swap



Interest Rate Swap



Cash Flow		2017.1.1	2018.1.1	
Payment to Bank		-32,000	-31,000	-(LIBOR+2%)
SWAP	Payment to Swap Dealer	-11,600	-11,600	-1.16%
	Receive from Swap Dealer	+12,000	+11,000	LIBOR
Total		-31,600	-31,600	-3.16%





You're a Champion!

Thanks for staying with us. You have finished this chapter.