

Master HI / TEW

Financial Risk Management

Prof Smits



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Financial Risk Management

Samenvatting

Academiejaar 2014-2015

Prof. Smits

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C1. Introduction

1.1 What is this course about?

Let's assume you are the lead contractor for a huge construction project (headquarters: Woluwe, BE) like the Burj Khalifa Tower (750m USD). You have to manage all the risks involved. What **financial** risks do you see?

Financial risk: a risk for which you can go to the market and mitigate the risk in a transferable way. The financial markets have to be willing to cover/take on the risk.

- **Credit risk:** will you get paid on your receivables by your contract counterpart?
- **Foreign Exchange Risk:** the contract is likely to be in USD, but you're accounting currency is EUR and some of your payables might be in non-USD currencies. If the dollar would go down substantially, you will lose money.
- **Interest Rate Risk:** you are pre-financing part of this transaction and you would need to pay a variable interest on the bridge loans you are taking out. If the interest rate goes up, you will have to pay more. The cash flows that you have to pay for the loan are exposed to the interest rate. You can hedge this.
- **Commodity risk:** Glass, Steel, Pig Iron and other raw materials can fluctuate in price while the tower is being constructed. Glass is produced with Si and that requires a lot of energy. Thus it is dependent on the price of energy.

1.2 Case study: the Gate Group

	2012	2013
	(millions of CHF)	
Revenue	2995	3002
EBITDA	171	168
Operating Profit	15,4	98,6
Net Profit	-56,3	21
Net Debt	258	261
Total Assets	1531	1466
Employees	26614	27393
Facilities	172	163



Christoph Schmitz

Christoph Schmitz joined gategroup as Chief Financial Officer on January 19, 2015. He oversees the global financial activity for the Group, encompassing financial strategy and planning, accounting and control, treasury and financial management as well as tax and investor relations.

[read less](#)



Catering Services



Network Solutions



Products



Airport Services

The Gategroup is Swiss-based. They are in the catering business and most of its customer base is airports.

What **financial risks** would you encounter here?

- **Commodity risks:** for the food (e.g. orange juice...), oil prices (styrene, made from crude oil, is used for the plastic cups). You could look at the correlation between crude oil and styrene and see how the price of crude oil influences the price of styrene.
- **Exchange rate risk:** Swiss Franc against the EUR. You can hedge the Balance sheet or the revenue streams.
- **Credit risk:** Airline companies might go bust. You can do securitization of the risk or hedge it in the market.
- **Interest rate risk:** they use debt and thus they have an interest rate risk.

1.3 What is a derivative?

A **derivative** is an instrument whose value depends on, or is derived from, the value of another asset and traded on exchanges or OTC. A derivative can be used for hedging, speculation or arbitrage.

Examples: futures, forwards, swaps (exchanging flows: e.g. floating vs. fixed rate or EUR vs. USD), options, exotics...

Why derivatives are important

Derivatives play a key role in **transferring risks** in the economy.

The **underlying assets** include stocks, currencies, interest rates, commodities, debt instruments, electricity, insurance payouts, the weather, etc.

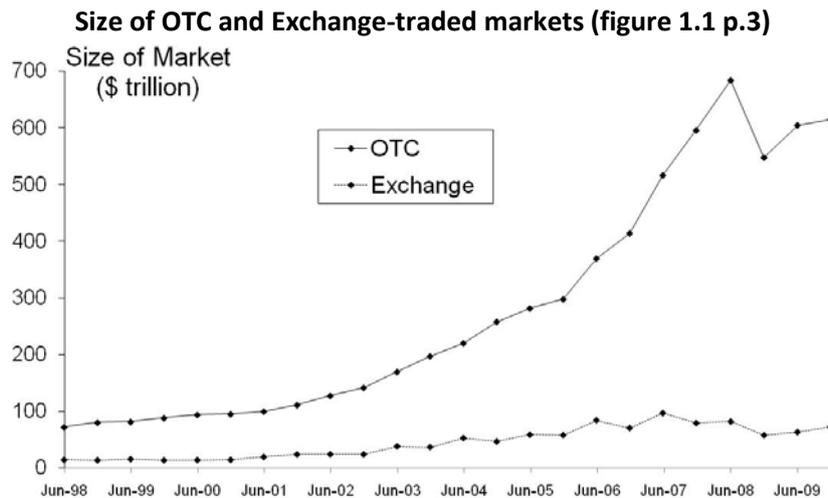
Many financial transactions have embedded derivatives.

- E.g. a mortgage with a fixed rate: every customer has the right to pay back the loan provided that 3 months of interest are paid to the bank. You can refinance in this way. This is a financial option that is embedded in the law. (~ option to refinance)

How derivatives are traded

Derivatives are traded on...:

- A **derivatives exchange** such as the Chicago Board Options Exchange. Individuals trade standardized contracts that have been defined by the exchange. The underlying assets include foreign currencies, stocks, stock indices...
- In the **over-the-counter (OTC)** market where traders working for banks, fund managers and corporate treasurers contact each other directly. It is a telephone and computer-linked network of dealers. Trades are done over the phone and are usually between two financial institutions or between a financial institution and one of its clients (typically a corporate treasurer or fund manager).



The chart shows total principal amounts for OTC market and value of underlying assets for exchange market. OTC provided more flexibility because the terms of the contract do not have to be specified by an exchange. The disadvantage is that there is some credit risk. The liquidity on the exchange is a major problem with bonds or derivatives. That is why they work with standardized contracts. (not a problem with stocks)

The Lehman bankruptcy: a derivatives nightmare

Lehman's filed for bankruptcy on September 15, 2008. This was the biggest bankruptcy in US history. Lehman was an active participant in the OTC derivatives markets and got into financial difficulties because it took high risks and found it was unable to roll over its short term funding. It had 200,000 transactions outstanding with about 8,000 counterparties. Unwinding these transactions has been challenging for both the Lehman liquidators and their counterparties.

How derivatives are used

Derivatives are used...:

- To hedge risks
- To speculate (take a view on the future direction of the market)
- To lock in an arbitrage profit (making a riskless profit)
- To change the nature of a liability
- To change the nature of an investment without incurring the costs of selling one portfolio and buying another
 - E.g. you have a diversified US stock portfolio, but you think it won't go up anymore. Instead of selling you entire portfolio, you could short the S&P500 with a derivative.

1.4 Forward contracts

Spot contract: agreement to buy or sell an asset today.

Forward contract: agreement to buy or sell an asset at a certain future time for a certain price. A forward contract is traded OTC.

The party that has agreed to **buy** has what is termed a **long** position

The party that has agreed to **sell** has what is termed a **short** position

Foreign exchange quotes for USD/CHF, 6 Feb 2015

	Bid	Offer
Spot	0.9262	0.9265
1-month forward	0.9259	0.9263
3-month forward	0.9253	0.9257
6-month forward	0.9243	0.9247

Spot rate: the rate would get within 2 business days.

Spread: difference between Bid and Offer. (used to cover the risk of the market maker)

Why does the bid and offer decline over time?

The price decreases over time because of **interest rate differential**: the difference in interest rates in the U.S. and Swits.

	<u>Interest rates:</u>		
	Now:		6m:
USD	1000000	0,38%	1001900
CHF	926200	0%	926200
	0,9262 ≠		0,924444

Forward Price

The **forward price** for a contract is the delivery price that would be applicable to the contract if were negotiated today (i.e., it is the delivery price that would make the contract worth exactly zero). Its price may be different for contracts of different maturities (as shown by the table)

Can you think of a reason for this? (Interest rate differential)

Profit from a Long Forward position

Example: Using forward contracts to hedge foreign exchange risk

Foreign exchange quotes for GBP, May 24, 2010 (p.5)

	Bid	Offer
Spot	1.4407	1.4411
1-month forward	1.4408	1.4413
3-month forward	1.4410	1.4415
6-month forward	1.4416	1.4422

On May 24, 2010 the treasurer of a corporation enters into a long forward contract on GBP to buy

£1 million in 6 months at an exchange rate of 1.4422. This obligates the corporation to pay \$1,442,200 for £1 million on November 24, 2010. The bank (or other counterparty) then has a short forward position on GBP. [K = delivery price; S_T = Spot price at time T]

What are the possible outcomes?

- Spot exchange goes to 1.5000 at the end of 6 months:

$$\text{Payoff for corporation (Long): } S_T - K = 1,500,000 - 1,442,200 \\ = \mathbf{57,800}$$

$$\text{Payoff for bank (short): } K - S_T = 1,442,200 - 1,500,000$$

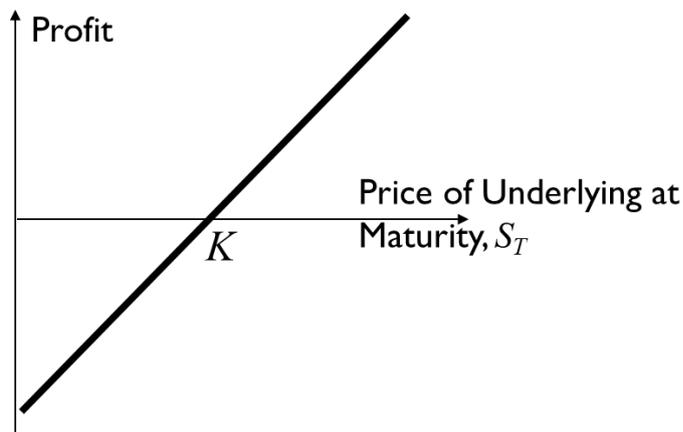
$$= \mathbf{-57,800}$$

- Spot rate fell to 1.3500:

$$\text{Payoff for corporation (Long): } S_T - K = 1,350,000 - 1,442,200 \\ = \mathbf{-92,200}$$

$$\text{Payoff for bank (short): } K - S_T = 1,442,200 - 1,350,000$$

$$= \mathbf{92,200}$$



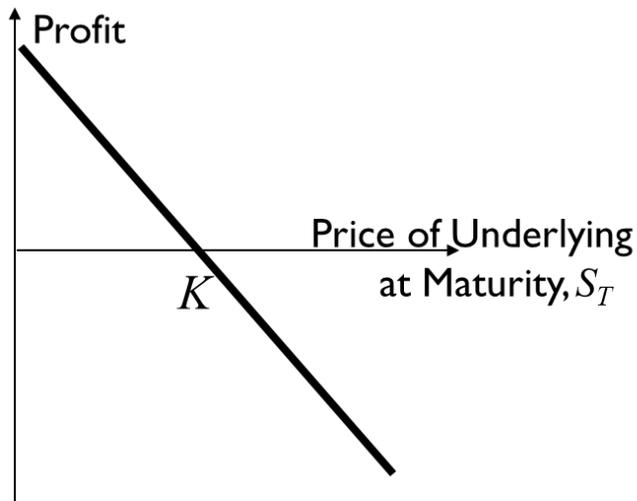
K = delivery price = Forward price at time contract is entered into

S_T = Spot price of the asset at maturity of the contract

The payoff from a long position in a forward contract of one unit of an asset is:

$$S_T - K$$

Profit from a Short Forward position



The payoff from a short position in a forward contract on one unit of the asset is:

$$K - S_T$$

The payoffs can be either negative or positive. Because it costs nothing to enter into a forward contract, the payoff from the contract is also the trader's total gain or loss from the contract.

Example: link between forward and spot price

Consider a stock that pays no dividend and is worth \$60. You can borrow and lend money for 1Y at 5%.

What should the 1Y forward price of the stock be?

$$\begin{aligned} K &= \$60 \times (1 + 5\%) \\ &= \$63 \end{aligned}$$

What if the forward price is \$67?

The forward is priced too expensive, so you need to short it and you can create an arbitrage:

Borrow \$60 } initial investment of 0 at t_0
 Buy 1 stock @ \$60 }
 Short the forward at \$67
 → Payoff at maturity = +\$67 - \$60 x (1+5%)
 = **+\$4**

What if the forward price is \$58?

The forward is priced too cheap, so you need to long it and you can create an arbitrage:

Sell 1 stock @ \$60
 Invest (proceeds from selling the stock) \$60
 Long the forward at \$58
 → Payoff at maturity = -\$58 + \$60 x (1+5%)
 = **+\$5**

1.5 Futures contracts

Futures contract: Agreement between two parties to buy or sell an asset for a certain price at a certain time in the future. Similar to forward contract, but whereas a forward contract is traded **OTC**, a futures contract is traded on an **exchange**. The exchange specifies the certain standardized features of the contract.

Exchange trading futures

- CME Group (formerly Chicago Mercantile Exchange and Chicago Board of Trade)
- NYSE Euronext
- BM&F (Sao Paulo, Brazil)
- TIFFE (Tokyo)
- ICE (Intercontinental Exchange)
- and many more (see list at end of book)

Examples of Futures contracts

Agreement to:

- Buy 100 oz. (ounces) of gold @ US\$1400/oz. in December
- Sell £62,500 @ 1.4500 US\$/£ in March
- Sell 1,000 bbl. of oil @ US\$90/bbl. in April
- Buy 10 x the value of the BEL-20 Index @ 2534 in March
- Buy 37,500 lbs of Arabica Coffee in December @ 177.20 US\$/ct/lbs
 - If you don't specify what underlying commodity that has to be delivered, you will always get the worst.

Intercontinental Exchange (ICE)

GLOBAL INFRASTRUCTURE

FUTURES EXCHANGES	SECURITIES EXCHANGES	OTC MARKETS	CENTRAL CLEARING HOUSES	TECHNOLOGY
MARKETS				PRODUCTS
ICE Futures U.S.				Ags, FX, Credit, Energy, Equities/Index/Options
ICE Futures Europe				Energy, Ags, Interest Rates, Equities/Index/Options, Bonds
ICE Futures Canada				Ags
ICE Futures Singapore				Ags, FX, Metals, Energy
ICE Endex				Energy

Coffee C – contract

The Coffee C contract is the world benchmark for Arabica coffee. The contract prices physical delivery of exchange-grade green beans, from one of 19 countries of origin in a licensed warehouse to one of several ports in the U. S. and Europe, with stated premiums/discounts for ports and growths.

(e.g. delivery in Antwerp = -1.25 ct/lbs; coffee from Colombia)

Coffee C – contract specifications

Contract Symbol: KC

Contract Size: 37,500 pounds

Price Quotation Cents (up to 2 decimals)

Contract Listings: March, May, July, September, December

Minimum Price Movement: 0.05 cent/lb., equivalent to \$18.75 per contract.

Settlement: Physical (according to deliveryGrade/Standards/Quality)

Example: Gold arbitrage

Example one:

Arbitrage: a way to make money without running a real/significant risk

Suppose that:

The spot price of gold is US \$1,400

The 1-year forward price of gold is US \$1,500

The 1-year US\$ interest rate is 5% per annum

Is there an *arbitrage opportunity*?

What should the price of the forward be: $1,400 \times (1+5\%) = 1,470 \rightarrow$ short the forward!

Now: Short the forward contract @ 1,500

Buy the spot @ 1,400

Borrow 1,400

Payoff in 1Y: $+ 1500 - 1400 \cdot (1 + 5\%) = +30$

Example two

Suppose that:

The spot price of gold is US\$1,400

The 1-year forward price of gold is US\$1,400

The 1-year US\$ interest rate is 5% per annum

Is there an *arbitrage opportunity*?

What should the price of the forward be: $1,400 \times (1+5\%) = 1,470 \rightarrow$ long the forward!

Now: Long the forward @ 1,400

Short the spot @ 1,400

Invest (the proceed from selling the stock at T_0) 1,400

Payoff in 1Y: $-1,400 + 1,400 \times (1+5\%) = + 70$

However you should be able to lease gold and if the gold-lease-rate is less than 5%!

The Forward price of Gold

(ignores the gold lease rate)

$$F = S \cdot (1 + r)^T$$

R: 1-year (domestic currency) risk-free rate of interest.

S: Spot price of gold

T: amount of years

In our examples: $S = 1400$, $T = 1$, and $r = 0.05$ so that

$$\rightarrow F = 1400 \cdot (1+0.05)^1$$

$$= 1470$$

Example: Oil arbitrage

Example one:

Suppose that:

- The spot price of oil is US\$95
- The quoted 1-year futures price of oil is US\$125
- The 1-year US\$ interest rate is 5% per annum
- The storage costs of oil are 2% per annum

Is there an *arbitrage opportunity*?

What should the price of the future be: $95 \times (1 + (5\% + 2\%)) = 101.65 \rightarrow$ short the forward!

Now: Short the future @ 125

Buy oil @ 95

Borrow 95

$$\begin{aligned}\text{Payoff in 1Y} &= -95 \cdot (1 + 2\% + 5\%) + 125 \\ &= -101.65 + 125 \\ &= \mathbf{+23.35}\end{aligned}$$

Example two:

Suppose that:

- The *spot price* of oil is US\$95
- The quoted 1-year *futures price* of oil is US\$80
- The 1-year US\$ *interest rate* is 5% per annum
- The *storage costs* of oil are 2% per annum

Is there an *arbitrage opportunity*?

What should the price of the future be: $95 \times (1 + (5\% + 2\%)) = 101.65 \rightarrow$ long the forward!

Now: long the future @ 80

Sell oil (spot) @ 95

Invest 95

$$\text{Payoff in 1Y} = +95 \times (1 + 5\%) - 80 = 19.75$$

In 1 year: you pay $80 \cdot (1 + 5\%) = 84$ for the Forward and get $95 \cdot (1 - 2\%) = 93.1$, thus make a profit of 9.1

Problem: However you can't short oil!! Only refineries will take this opportunity. Oil is a consumption commodity and thus can't be shorted if you don't have the commodity.

1.6 Options

A **call option** is an option to buy an underlying asset by a certain date for a certain price (the strike price)

A **put option** is an option to sell an underlying asset by a certain date for a certain price (the strike price)

The date of the contract is known as the **expiration date** or **maturity**.

Buying an option: acquiring the right to...

Selling an option: giving the right to someone to...

Example

“Suppose that a June put option to sell a share at \$60 costs \$4 and is held until maturity. Under what circumstances will the seller of the option make a profit? Under what circumstances will the option be exercised?”

If price drops below \$56 ($=\$60-\4), you will make a profit. The profit is limited to 56, if the stock goes bankrupt. (Actually lower because you will probably borrow money and have to pay interest)

American vs. European options

An **American option** can be exercised at any time during its life.

A **European option** can be exercised only at maturity

A **Bermudan Option** can be exercised on discrete moments in time (e.g. at the end of every month)

Google Call Option prices (June 15, 2010; Stock price is bid 497.07 and offer 497.25)

Strike Price	Jul 2010 Bid	Jul 2010 Offer	Sep 2010 Bid	Sep 2010 Offer	Dec 2010 Bid	Dec 2010 Offer
460	43.30	44.00	51.90	53.90	63.40	64.80
480	28.60	29.00	39.70	40.40	50.80	52.30
500	17.00	17.40	28.30	29.30	40.60	41.30
520	9.00	9.30	19.10	19.90	31.40	32.00
540	4.20	4.40	12.70	13.00	23.10	24.00
560	1.75	2.10	7.40	8.40	16.80	17.70

The price of a call/put option increases as maturity goes up: If the maturity goes up, the risk goes up and thus the price goes up.

The price of a call option decreases as the strike price increases: If the strike price goes up, the less likely it would be that someone would exercise the call option and thus the price is less. If the strike price goes up, the price of the put option would go up.

Google Put Option prices (June 15, 2010; Stock price is bid 497.07 and offer 497.25)

Strike Price	Jul 2010 Bid	Jul 2010 Offer	Sep 2010 Bid	Sep 2010 Offer	Dec 2010 Bid	Dec 2010 Offer
460	6.30	6.60	15.70	16.20	26.00	27.30
480	11.30	11.70	22.20	22.70	33.30	35.00
500	19.50	20.00	30.90	32.60	42.20	43.00
520	31.60	33.90	41.80	43.60	52.80	54.50
540	46.30	47.20	54.90	56.10	64.90	66.20
560	64.30	66.70	70.00	71.30	78.60	80.00

If the strike price goes up, the price of the put option would go up.

Example: AEX Index Call option.

AEX index is trading around 345. June AEX Futures trades at 338.40

Strike Price	Jun 2013 Call	Sep 2013 Call	Dec 2013 Call	Jun 2013 Put	Sep 2013 Put	Dec 2013 Put
300						
320						
340	10.25			11.00		
350						
360						
380						

Is there an arbitrage opportunity?

You could:

- long put (340): -11.00
- short call (340): +10.25
- long future @ 338.40

$$T_0: (-11.00 + 10.25) = -0.75$$

$$T_1: (-338.60 + 340) = \text{€}1.60$$

$$\rightarrow \text{arbitrage: } \text{€}1.60 - 0.75 = 0.85$$

1.7 Options vs. Futures/Forwards

A **futures/forward contract** gives the holder the obligation to buy or sell at a certain price

An **option** gives the holder the right to buy or sell at a certain price

1.8 Types of traders

There are three types of traders:

- Hedgers (reduce risks)
- Speculators (bet on future directions in a market variable)
- Arbitrageurs (exploit inefficiencies)

Hedging examples

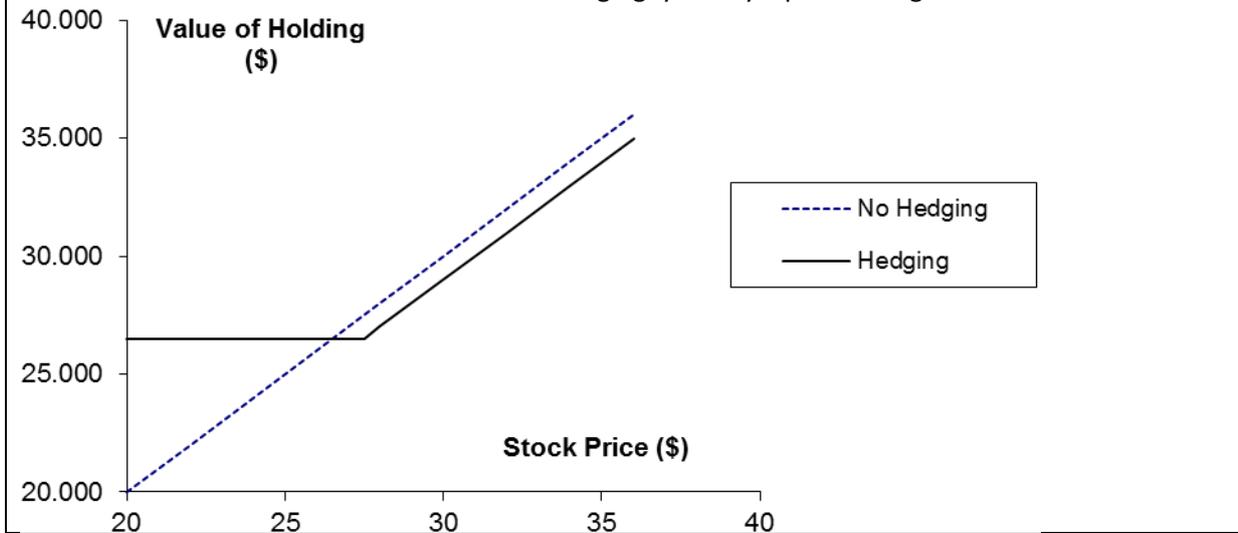
A US company will pay £10 million for imports from Britain in 3 months and decides to hedge using a long position in a forward contract.

An investor owns 1,000 Microsoft shares currently worth \$28 per share. A two-month put with a strike price of \$27.50 costs \$1. The investor decides to hedge by buying 10 contracts

A hedger can become a speculator!

Example: Microsoft

Value of Microsoft Shares with and without Hedging: you buy a put to hedge it.



Speculative example

An investor with \$2,000 to invest feels that a stock price will increase over the next 2 months. The current stock price is \$20 and the price of a 2-month call option with a strike of 22.50 is \$1

What are the *alternative strategies*?

- Strategy 1: purchase 100 shares: if stock price goes to \$27

$100 \times (\$27 - \$20) = \mathbf{\$700}$

- Strategy 2: purchase 2,000 call options (20 call option contracts):

$2,000 \times (\$27 - \$22.50) = \$9,000$

Subtract the cost of the options (\$1/option):

$\$9,000 - \$2,000 = \mathbf{\$7,000}$

The profit is far greater, but the loss can be greater as well: suppose stock price goes to \$15

Strategy 1: $100 \times (\$15 - \$20) = \mathbf{-\$500}$

Strategy 2: you won't exercise the option, but you lose the costs: $\mathbf{-\$2,000}$

	<i>December stock price</i>	
<i>Investor's strategy</i>	<u>\$15</u>	<u>\$27</u>
Buy 100 shares	-\$500	\$700
Buy 2,000 call options	-\$2,000	\$7,000

Arbitrage example

Arbitrageurs lock in a riskless profit by simultaneously entering into transaction in two or more markets.

A stock price is quoted as £100 in London and \$140 in New York. The current exchange rate is \$1.4300 per pound.

What is the *arbitrage opportunity*?

Buy 100 shares in New York @ \$140

Sell 100 shares in London @ £100

→ Payoff: $100 \times (+100 \times 1.4300 - \$140) = \$300$

However: transaction costs would probably eliminate the profit for a small investor.

Dangers

Traders can switch from being hedgers to speculators or from being arbitrageurs to speculators. It is important to set up controls to ensure that trades are using derivatives in for their intended purpose.

Société General (see Business Snapshot 1.3 on page 17) is an example of what can go wrong! Risk limits should be set and traders should be monitored daily.

1.9 Hedge Funds

Hedge funds are not subject to the same rules as mutual funds and cannot offer their securities publicly.

Mutual funds must

- disclose investment policies,
- makes shares redeemable at any time,
- limit use of leverage
- Take no short positions.

Hedge funds are not subject to these constraints. They use complex trading strategies and are big users of derivatives for hedging, speculation and arbitrage

Types of Hedge Funds

Long/Short Equities; Convertible Arbitrage; Distressed Securities; Emerging Markets; Global macro; Merger Arbitrage....

C2. Mechanics of Futures Markets

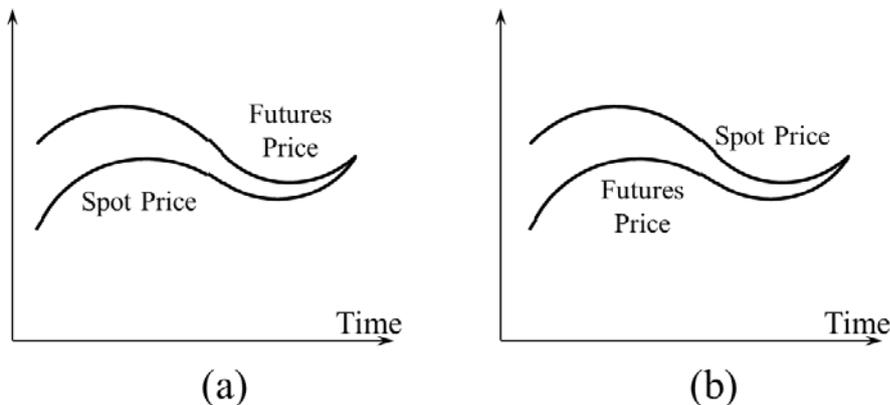
2.1 Futures contracts

Future contracts (e.g. a coffee contract) are available on a wide range of assets. They are exchange traded and settled daily.

Specifications need to be defined:

- What can be delivered (the asset, the contract size)
- Where it can be delivered
- When it can be delivered

2.2 Convergence of Futures to Spot



As the delivery period for a futures contract is approached, the futures price converges to the spot price of the underlying asset. When the delivery period is reached, the futures price equals – or is very close to – the spot price.

2.3 Margins

A **margin** is cash or marketable securities deposited by an investor with his or her broker. The balance in the margin account is adjusted to reflect *daily settlement* or *marking to market*. Margins minimize the possibility of a loss through a *default* on a contract. They are also used in OTC derivative transactions since the credit crisis. The investor is entitled to withdraw any balance in the margin account in excess of the initial margin.

To ensure that the balance in the margin account never becomes negative a *maintenance margin*, which is somewhat lower than the initial margin, is set. If the balance in the margin account falls below the maintenance margin, the investor receives a *margin call* and is expected to top up the margin account to the initial margin level by the end of the next day.

Example of a Futures trade

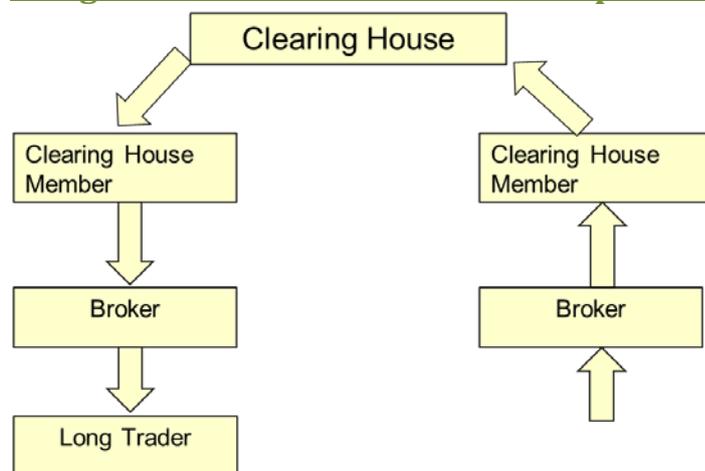
An investor takes a long position in 2 December gold futures contracts on June 5

- Contract size is 100 oz.
- futures price is US\$1250
- initial margin requirement is US\$6,000/contract (US\$12,000 in total)
- maintenance margin is US\$4,500/contract (US\$9,000 in total)

Possible outcome:

Day	Trade Price (\$)	Settle Price (\$)	Daily Gain (\$)	Cumul. Gain (\$)	Margin Balance (\$)	Margin Call (\$)
1	1,250.00				12,000	
1		1,241.00	-1,800	- 1,800	10,200	
2		1,238.30	-540	-2,340	9,660	
.....		
6		1,236.20	-780	-2,760	9,240	
7		1,229.90	-1,260	-4,020	7,980	4,020
8		1,230.80	180	-3,840	12,180	
.....		
16	1,226.90		780	-4,620	15,180	

Margin cash flows when Futures price increases

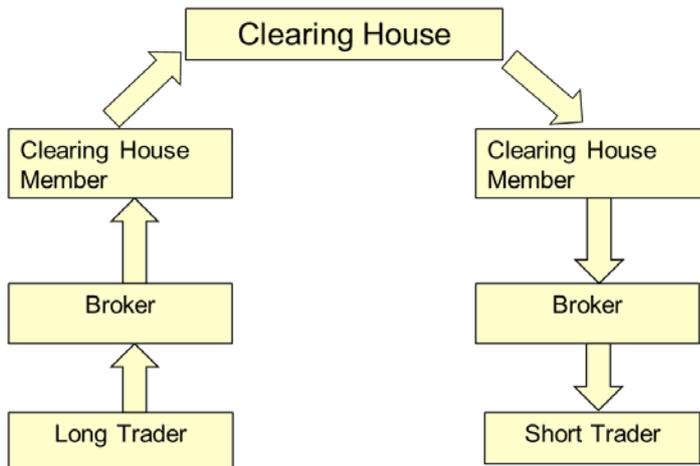


Long trader

Short trader

A **clearing house** acts as an intermediary in futures transactions. It guarantees the performance of the parties to each transaction. The clearing house has a number of members, who must post funds with the clearing house. The main task of the clearing house is to keep track of all the transactions that take place during a day, so that it can calculate the net position of each of its members.

Margin cash flows when Futures price decreases



2.5 Some terminology

Open interest: the total number of contracts outstanding

- equal to number of long positions or number of short positions

Trading Volume: the number of trades in one day.

Settlement price: the price just before the final bell each day

- used for the daily settlement process

At beginning of trading: Open interest = volume of trading.

During the day: Volume of trading goes up and open interest could go up or down.

Key points about futures

- They are settled daily.
- Closing out a futures position involves entering into an offsetting trade.
- Most contracts are closed out before maturity, and thus no delivery.

Crude oil trading on May 26, 2010

	Open	High	Low	Settle	Change	Volume	Open Int
Jul 2010	70.06	71.70	69.21	71.51	2.76	6,315	388,902
Aug 2010	71.25	72.77	70.42	72.54	2.44	3,746	115,305
Dec 2010	74.00	75.34	73.17	75.23	2.19	5,055	196,033
Dec 2011	77.01	78.59	76.51	78.53	2.00	4,175	100,674
Dec 2012	78.50	80.21	78.50	80.18	1.86	1,258	70,126

2.6 OTC Markets

Collateralization:

It is becoming increasingly common for transactions to be collateralized in OTC markets.

Consider transactions between companies A and B that have entered in an OTC derivatives transaction such as a forward:

A collateralization agreement applying to the transaction might involve the transaction being valued every day. Collateralization significantly reduces the credit risk in OTC markets.

These might be governed by an ISDA Master agreement with a credit support annex (CSA). The CSA might require A to post collateral with B equal to the value to B of its outstanding transactions with B when this value is positive. If A defaults, B is entitled to take possession of the collateral. The transactions are not settled daily and interest is paid on cash collateral

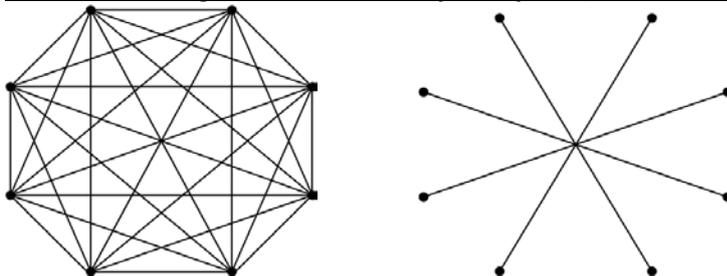
See Business Snapshot 2.2 for how collateralization affected Long Term Capital Management when there was a “flight to quality” in 2008.

Clearing houses in OTC Markets

Traditionally transactions have been cleared bilaterally in OTC markets. Following the 2007-2009 crisis, there has been a requirement for most standardized OTC derivatives transactions to be cleared centrally through clearing houses.

Clearing houses in OTC markets: An OTC transaction is negotiated between two parties, A and B, in the usual way. It is then presented to a clearing house. Assuming the clearing house accepts the transaction, it becomes the counterparty to both A and B. It manages this risk by requiring an initial margin and daily variation margins from them.

Bilateral clearing (between market participants) vs. Central clearing house



Delivery

If a futures contract is not closed out before maturity, it is usually settled by delivering the assets underlying the contract. When there are alternatives about what is delivered, where it is delivered, and when it is delivered, the party with the **short** position chooses.

A few contracts (for example, those on stock indices and Eurodollars) are settled in cash, because it is inconvenient or impossible to deliver the underlying asset.

e.g. futures contract on the S&P500: delivery would involve a portfolio of 500 stocks.

“When a new trade is completed what are the possible effects on the open interest?”

“Can the volume of trading in a day be greater than the open interest?”

2.8 Types of orders

Market order: trade carried out immediately at the best price available in the market.

Limit order: specifies a particular price. The order can be executed only at this price or at one more favorable to the investor.

Stop-loss or stop order: order is executed at the best available price once a bid or offer is made at that particular price or a less-favorable price.

e.g.: the current price is \$35, but you can issue a stop-loss order at \$30 to limit your (potential) losses.

Stop-limit order: combination of stop order and a limit order. The 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.

Market-if touched (MIT): order executed at the best available price after a trade occurs at a specified price or at a price more favorable than the specified price. A MIT becomes a market order once the specified price has been hit.

Discretionary order or market-not-held order: traded as a market order except that execution may be delayed at the broker's discretion in an attempt to get a better price.

Time-of-day order: specifies a particular period of time during the day when the order can be executed.

Open order: is in effect until executed or until the end of trading in the particular contract.

Fill or kill order: order executed immediately on receipt or not at all.

2.9 Regulation of Futures

In the US, the regulation of futures markets is primarily the responsibility of the Commodity Futures and Trading Commission (CFTC).

Regulators try to protect the public interest and prevent questionable trading practices.

2.10 Accounting & tax

Ideally hedging profits (losses) should be recognized at the same time as the losses (profits) on the item being hedged. Ideally profits and losses from speculation should be recognized on a mark-to-market basis. Roughly speaking, this is what the accounting and tax treatment of futures in the U.S. and many other countries attempt to achieve.

2.10 Overview: Forward vs. Futures contract

FORWARDS	FUTURES
Private contract between 2 parties	Exchange traded
Non-standard contract	Standard contract
Usually 1 specified delivery date	Range of delivery dates
Settled at end of contract	Settled daily
Delivery or final cash settlement usually occurs	prior to maturity
Some credit risk	Virtually no credit risk

2.11 Foreign Exchange quotes

Futures exchange rates are **quoted** as the number of USD per unit of the foreign currency

Forward exchange rates are **quoted** in the same way as spot exchange rates. This means that GBP, EUR, AUD, and NZD are quoted as USD per unit of foreign currency. Other currencies (e.g., CAD and JPY) are quoted as units of the foreign currency per USD.

Trading game:

Future is Cash Settled after 5 cards have been revealed. There will be 10 trading entities that will have to make markets (prices of 2 points wide, e.g. 30-32). Each trading entity needs :

- at least 1 market maker
- at least 1 settlements observer (to keep track of the open positions with the exchange)

A trading entity can have "proprietary traders" or "arbitrageurs"

Mechanics:

First Trading begins without a single card having been drawn. Every Trading Entity makes a market within 1 minute of the card being drawn. As soon as a bank makes a market, any trading entity can hit the price (for one contract). After being hit, the price of the bank becomes automatically "off-market" and you can no longer trade with that bank until a new market price is being made by it.

After being hit on a price, the bank has to submit a new market making pricing within 1 minute. In practice: the non-quoting bank will have a price of 6-50. Let us agree that hitting a price of 6 or a price of 50 means that no trade took place !!!

Homework:

AEX Index Options on 7 Feb 2014;
 AEX index is trading around 389.50;
 June AEX Future Trades at 382.30

Is there an **arbitrage opportunity** (Doing a risk-free investment and getting a return)?

JUNE 2014 KOERSEN - 07/02/14													EXTENDED VIEW	
Calls						Puts								
Settl.	O.I.	Dag Vol	Laatst	Bied	Laat	Strike	Bied	Laat	Laatst	Dag Vol	O.I.	Settl.		
38.05	606	12	38.40	37.85	38.30	C	350.00	P	4.85	5.00	4.84	62	1,611	4.93
29.97	798	52	30.15	29.80	30.20	C	360.00	P	6.75	6.90	6.90	321	1,127	6.84
16.17	1,555	234	16.05	16.10	16.35	C	380.00	P	12.90	13.10	13.40	404	2,277	13.02
6.88	9,915	265	6.75	6.80	7.00	C	400.00	P	23.50	23.85	23.70	66	7,583	23.72
2.29	2,683	73	2.30	2.25	2.35	C	420.00	P	38.85	39.25	39.55	9	509	39.11

Now: you need to do the following trades

- Short call (380): +16.05
 - Long put (380): -13.40
 → short future (380)
1. Long future (382.30)

The loss will be:

= buying the future at 382.30 and selling it at 380
 = -382.30 + 380
 = **-2.30**

However you receive from the option premiums:

= 16.05 - 13.40
 = **+2.65**

→ Profit: +2.65 - 2.30 = **0.35**

