



Fall 2013  
ADVANCED FINANCIAL INSTRUMENTS AND MARKETS  
**Lecture No. 10**  
**Financial Strategies Using**  
**Futures**  
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Introduction

- \* Forwards Agreement
- \* Future Agreement
- \* Counter Party Risk
- \* Margin Account
- \* Future Curve



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A Brief History

\* In the 1840s, Chicago had become a commercial center and Midwest farmers came to Chicago to sell their wheat to dealers who, in turn, shipped it all over the country. Hence Chicago Board of Trade became the first commodity exchange where raw commodities were traded; bought and sold, via standardized contracts called "**Futures**"



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\* Before the actual harvest,  
\* **Farmers wanted to trade in futures to reduce the risk of bearish prices at harvest**  
\* **Dealers traded in futures to reduce the risk of bullish prices at harvest as well as consistent quality as all commodities traded at the exchange are graded and standardized.**

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### What Is A Futures Contract?

\* **Futures contract** is a standardized contract, traded on a futures exchange, to buy or sell a certain underlying instrument (e.g. gold) at a specific date in the future, at a pre-set price. The future date is called the **delivery date**. The pre-set price is called the **futures price**. As time passes the value of the contract changes relative to the pre-set price based on the traders expectations of the future spot price of the underlying commodity.  
\* Over a period of time the **price of the futures contract converges to the spot price** of the respective commodity.  
\* **On the day of the contract maturity/delivery date the price of the futures contract will be equivalent to the spot price** of the underlying asset.

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### Specifications of Future Contract

\* The following specifications are usually listed on a Futures contract:  
\* The name of the **underlying commodity**, for example "Gold"  
\* The **type of settlement**, either cash settlement or physical settlement  
\* The **quantity** and units of the underlying asset  
\* The **currency** in which the futures contract is quoted  
\* The **grade** or quality of the deliverable  
\* The **delivery month**  
\* The **last trading date**

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### Futures vs. Stock

- \* Unlike stocks, which represents equity in a company and can be held for a long time, if not indefinitely, **futures contracts have finite lives and a determined expiry date**
- \* **A futures investor can sell a future without having first bought it** if he is expecting prices of the commodity to go down in the future. This option of selling before buying does not exist with stocks.
- \* **Futures are highly leverage investments.** The trader puts up a small fraction of the underlying contract (usually between 5%-25%) as margin, yet can ride over the full value of the contract as it moves up and down. The money he puts up is not a down payment on the underlying contract, but a performance bond

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### Who Trades Futures & Why?

- \* Futures traders are typically put in one of the two groups:
- \* **Hedgers**, who have an interest in the underlying commodity and are seeking to **hedge out the risk of price changes**. They typically include **producers and consumers of a commodity**
- \* **Speculators**, who seek to **make a profit by predicting market moves** and buying a commodity “on paper” for they have no practical use.
- \* **Arbitrageurs**, who seek to **make risk free profit** on a commodity by exploiting differentials between the spot price and the futures market of a particular commodity due to mispricing. Such opportunities are rare and fleeting. The presence of arbitrageurs ensures that futures prices move in tandem with the cash/spot rates.

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### How Does “Arbitrage” Make TheFutures Market Efficient

- \* “Arbitrageurs” in the futures market are always watching the relationship between the “spot” and the “futures” in order to exploit such mis-pricing.
- \* If, for example, an arbitrageur realized that the gold futures in a certain month was overpriced in relation to the gold spot rate and/or risk-free interest rate, he would immediately sell these contracts knowing that he could easily lock in a risk free profit.
- \* Price of Future gold contract (maturing in 1 month).....Rs. 12,500
- \* Spot price of gold.....Rs. 12,000
- \* Risk free interest rate of 12% per annum.....Rs. 120
- \* By selling futures contract and buying gold on spot price the arbitrageur makes a **risk free profit of rupees 380**(12500-12000-120)

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### Taking A Position

- \* A trader can take any of the two positions based on his expectation about the price trend of the underlying commodity in the future.
- \* **Long positions**
  - \* At commodity futures exchange, if a trader purchases a **“buy contract”** then his stakes are positively related to the price of the underlying commodity i.e. the higher the commodity price the more profit he will make. This purchase of a “buy” futures contract is called taking a **“long”** position
- \* **Short position**
  - \* Reversely, if a trader purchases a “sell contract”, then his stakes are negatively related to the price of the underlying commodity i.e. the lower the commodity price the more profit he will make. This purchase of a “sell” futures contract is called taking a **“short”** position
- \* To maximize his profit, if he expects prices to fall, he should take a short position and if the expectation is of the commodity prices to go up in the future then he should consider a long position

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### Taking Delivery

- \* Brokerage firms watch their open accounts and know who has long (buy contract) and short (sell contract) positions in contracts nearing maturity.
- \* Prior to delivery day they inform customers who have open long positions that they must either close out the position by selling the contract in the futures market or prepare to take delivery and pay the full value (spot commodity rate on the day of maturity) of the underlying contract.
- \* On the few occasions that a buyer accepts delivery against his futures contract, he is given a receipt entitling him to fetch the commodity from a central distribution point, like in the case of “gold”, the gold bars can be picked up by the buyer against a receipt from NCEL designated vaults.

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### Clearing House

- \* Each futures exchange has a clearing association which operates in conjunction with the exchange in a manner similar to a bank clearing house. NCEL has an in house clearing department
- \* All brokers are members of the “Clearing House”. Every clearing house member must put up fixed original margins and maintain them with the clearing house in the advent of adverse price fluctuations. In such instances, the clearing house may request for additional margin payment.
- \* The exchange has the final say in all instances where a dispute arises

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## Session -II

- \* Ways Derivatives are Used
  - \* To hedge risks
  - \* To speculate (take a view on the future direction of the market)
  - \* To lock in an arbitrage 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




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## 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\$600
- \* margin requirement is US\$2,000/contract (US\$4,000 in total)
- \* maintenance margin is US\$1,500/contract (US\$3,000 in total)




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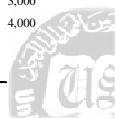
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## A Possible Outcome

Day	Futures Price (US\$)	Daily		Cumulative Gain (Loss) (US\$)	Account Balance (US\$)	Margin Call (US\$)
		Gain (Loss) (US\$)	Gain (Loss) (US\$)			
	600.00				4,000	
5-Jun	597.00	(600)	(600)	3,400	0	
13-Jun	593.30	(420)	(1,340)	2,660	1,340 = 4,000	< 3,000
19-Jun	587.00	(1,140)	(2,600)	2,740	+ 1,260 = 4,000	
26-Jun	592.30	260	(1,540)	5,060	0	




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## Other 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

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## Forward Contracts vs Futures Contracts

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	Contract usually closed out prior to maturity
Some credit risk	Virtually no credit risk

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## Hedging Strategies Using Futures

- \* A long futures hedge is appropriate when you know you will purchase an asset in the future and want to lock in the price
- \* A short futures hedge is appropriate when you know you will sell an asset in the future and want to lock in the price

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### Basis Risk

- \* Basis is the difference between the spot and futures price
- \* Basis risk arises because of the uncertainty about the basis when the hedge is closed out

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### Long Hedge

- \* We define
  - $F_1$ : Initial Futures Price
  - $F_2$ : Final Futures Price
  - $S_2$ : Final Asset Price
- \* If you hedge the future purchase of an asset by entering into a long futures contract then  
 Cost of Asset =  $S_2 - (F_2 - F_1) = F_1 + \text{Basis}$

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### Short Hedge

- \* Again we define
  - $F_1$ : Initial Futures Price
  - $F_2$ : Final Futures Price
  - $S_2$ : Final Asset Price
- \* If you hedge the future sale of an asset by entering into a short futures contract then  
 Price Realized =  $S_2 + (F_1 - F_2) = F_1 + \text{Basis}$

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### Choice of Contract

- \* Choose a delivery month that is as close as possible to, but later than, the end of the life of the hedge
- \* When there is no futures contract on the asset being hedged, choose the contract whose futures price is most highly correlated with the asset price. This is known as cross hedging.

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### Optimal Hedge Ratio

Proportion of the exposure that should optimally be hedged is

$$\rho \frac{\sigma_S}{\sigma_F}$$

where

- $\sigma_S$  is the standard deviation of  $\Delta S$ , the change in the spot price during the hedging period,
- $\sigma_F$  is the standard deviation of  $\Delta F$ , the change in the futures price during the hedging period
- $\rho$  is the coefficient of correlation between  $\Delta S$  and  $\Delta F$ .

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### Tailing the Hedge

- \* Two way of determining the number of contracts to use for hedging are
  - \* Compare the exposure to be hedged with the value of the assets underlying one futures contract
  - \* Compare the exposure to be hedged with the value of one futures contract (=futures price time size of futures contract)
- \* The second approach incorporates an adjustment for the daily settlement of futures

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## Hedging Using Index Futures

To hedge the risk in a portfolio the number of contracts that should be shorted is

$$\beta \frac{P}{F}$$

where  $P$  is the value of the portfolio,  $\beta$  is its beta, and  $F$  is the value of one futures contract

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## Example

S&P 500 futures price is 1,000  
Value of Portfolio is \$5 million  
Beta of portfolio is 1.5

What position in futures contracts on the S&P 500 is necessary to hedge the portfolio?

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## Changing Beta

- \* What position is necessary to reduce the beta of the portfolio to 0.75?
- \* What position is necessary to increase the beta of the portfolio to 2.0?

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## Why Hedge Equity Returns

- \* May want to be out of the market for a while. Hedging avoids the costs of selling and repurchasing the portfolio
- \* Suppose stocks in your portfolio have an average beta of 1.0, but you feel they have been chosen well and will outperform the market in both good and bad times. Hedging ensures that the return you earn is the risk-free return plus the excess return of your portfolio over the market.

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## Rolling The Hedge Forward

- \* We can use a series of futures contracts to increase the life of a hedge
- \* Each time we switch from one futures contract to another we incur a type of basis risk

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Thank You!



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