# ACUT 471 - Chapter 3: Futures Contracts

Dr. Mohammed Aba Oud

- Futures contracts are essentially exchange-traded forward contracts.
- Futures contracts represent a commitment to buy or sell an underlying asset at some future date.
- Futures contracts are standardized and have specified delivery dates, locations, and procedures.
- Futures may be traded either electronically or in trading pits.

- Forward contracts are settled at expiration, but futures contracts are settled daily to determine who owes what to whom (marking-to-market).
- Futures contracts are liquid—it is possible to offset an obligation on a given date by entering into the opposite position.
- Futures contracts are structured so as to minimize the effects of credit risk.

| ***Forward*** | ***Futures*** |
|---|---|
| Private contract between two parties | Traded on an exchange |
| Not standardized | Standardized |
| Usually one specified delivery date | Range of delivery dates |
| Settled at end of contract | Settled daily |
| Delivery or final settlement usual | Usually closed out prior to maturity |
| Some credit risk | Virtually no credit risk |

- **Margin**: Both buyers and sellers are required to deposit a performance bond with the broker to ensure that they can cover a specified loss on the position. This deposit, *which can earn interest*, is called **margin**.
- **A maintenance margin** is the minimum amount of money that must be maintained in a margin account. This is often set at 70% to 80% of the initial margin level.
- If the margin balance falls below the maintenance margin, then the trader receive a **margin call** and is requesting additional margin **to reach initial margin.**

| | |
|---|---|
| Underlying | S&P 500 index |
| Where traded | Chicago Mercantile Exchange |
| Size | \$250 $\times$ S&P 500 index |
| Months | March, June, September, December |
| Trading ends | Business day prior to determination of settlement price |
| Settlement | Cash-settled, based upon opening price of S&P 500 on third Friday of expiration month |

You are given that

- S&P 500 future price is 1100.
- The initial margin is 10%.
- The continuously compounded interest rate is 6%.
- The maintenance margin is 75% of the initial margin.

- We wish to enter into one long position futures (S&P 500 index).
- The notional value of one contract is ...
- Our initial margin is ...
- The maintenance margin is ...
- If the S&P 500 futures price drops by 1 point, then we lose ... per futures contract.

Suppose that settlement is weekly (in practice, settlement is daily)

- Over the first week, the futures price drops 72.01 points to 1027.99, we have lost ...
- We have a choice of either:
  - paying this loss directly,
  - or allowing it to be taken out of the margin balance.
- If the loss is subtracted from the margin balance, then our margin balance after 1 week becomes ...

- Now our margin balance becomes less than the maintenance margin. The broker would make a margin call, requesting additional margin (...) to reach the initial margin level.
- If we failed to post additional margin, the broker would close our position by entering into ... futures contracts and return to us the remaining margin ... .

A treader enter into 3 units of gold futures contract (100 ounce per contract) on the opening of Sep. 3 when the futures price is 348.4 per ounce.

- The initial margin is 1200 per contract.
- The margin account earns interest of 3% compounded continuously.
- The maintenance margin is 80%.

Calculate the margin account balance at the end of Sep. 5

| Day | Futures Price |
|---|---|
| Sep. 3 | 345.8 |
| Sep. 4 | 346.0 |
| Sep. 5 | 345.5 |

Suppose the S&P 500 future index is currently 1237.25 and the initial margin is 10%. The notional value is 250 per unit of the index. You wish to enter into 20 long position of S&P 500 index futures contracts.
a) Find the initial margin balnace.
b) Suppose you earn a continuously compounded rate of 4% on your margin balance, and your position is marked to market weekly. The maintenance margin is 75% of the initial margin.
What is the greatest S&P index future price 1 week from today at which you receive a margin call?

**Note:** It can be proven that
*If interest rates are constant then: forwarad price=futures price*

An investor enters a long position in a futures contract on an index $F$ with a notional value of $200F$, expiring in one year. The index pays an annual continuously compounded dividend yield of 4% and the annual continuously compounded risk-free interest rate is 2%. At time of purchase, the index price is 1100. Three months later, the investor has sustained a loss of 100. Assume the margin account earns an interest of 0%.
Calcuate the price of the index at the end of the $3^{rd}$ month.