Chapter 16  Futures Contracts

CBOT - Chicago Board of Trade was established in 1948 and it is still the most active futures exchange in the world.

- In 1972 the first financial futures, foreign currency contracts, were introduced at the CME (Chicago Mercantile Exchange).
- In 1982 Stock Index Futures were introduced.

Financial futures are now the largest dollar value in the futures market.
- Often used for financial risk management.

Speculators - Traders who accept the risk of taking a long or short position as a bet on the future direction of prices.

Hedger - Traders who seek to transfer price risk by taking the opposite position in the underlying commodity or financial instrument.

E.g. A corn farmer is long in corn (the physical product) so he would hedge by taking a short position in the futures market (i.e. he agrees to deliver corn) called a short hedge.

A long hedge would be for an apartment builder to take the long position in lumber futures.
Future Margin - Deposit of funds (can be T-Bills) in a futures trading account dedicated to covering potential losses from an outsized futures position. Both sides put up future margin.

Initial Margin - The initial margin deposit.

Maintenance Margin - The lowest that margin is allowed to fall to.

Marking to Market - Recognizing the futures gain or loss on a daily basis by changing the amount that is required as margin.

 Margin Call - Notification to increase the margin in your account or your account will be closed via reversing your position.

Reverse Trade - A trade that closes out a previously established futures position by taking the opposite position.

Cash Price (or Spot Price) - is the price of the commodity or financial instrument for immediate delivery.
Futures Price - The current price for a commodity to be delivered at a future date.

Basis - The difference between the cash price and the future price.

Basis = Cash Price - Futures Price

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**SPOT - FUTURES PARITY**

What should the futures price be?

Two ways to get the payoff from a stock, say to me from now.

1. Buy the stock and hold it.
2. Go long in the futures and buy a bond with face value = F_0

(a pure discount bond that is risk free) F_0 is also the future price; i.e., you choose the face value of the bond to equal the futures price.
<table>
<thead>
<tr>
<th>Option</th>
<th>Cost Today</th>
<th>Future Payoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Buy Stock</td>
<td>$-S_0$</td>
<td>$S_t$</td>
</tr>
<tr>
<td>1. Long in futures Contract</td>
<td>0</td>
<td>$S_t - F_0$</td>
</tr>
<tr>
<td>Buy a bond</td>
<td>$-\frac{F_0}{(1+r)^T}$</td>
<td>$F_0$</td>
</tr>
</tbody>
</table>

Combined Payoff for option 2:

\[ -\frac{F_0}{(1+r)^T} \]

To prevent arbitrage, if two investments have the same future payoff, they must have the same price today. This implies the cost today must be equal:

\[ -S_0 = -\frac{F_0}{(1+r)^T} \]

\[ S_0(1+r)^T = F_0 \]

or

\[ F_0 = S_0 (1+r)^T \]

The basic version of spot-future parity.

For a dividend paying stock where
\[ d = \text{dividend yield} \]

\[ F_0 = S_0 (1+r-d)^T \]
Note: You could use this approach to create a zero payoff portfolio by going long in the stock and short in the futures.

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>At Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock (Long)</td>
<td>(-S_0)</td>
<td>(S_T)</td>
</tr>
<tr>
<td>Short Futures</td>
<td>(0)</td>
<td>(F_0 - S_T)</td>
</tr>
<tr>
<td>Short a Bond</td>
<td>(\frac{F_0}{(1+r)^T})</td>
<td>(-F_0)</td>
</tr>
<tr>
<td>(\sum)</td>
<td>(\frac{F_0}{(1+r)^T} - S_0)</td>
<td>(0)</td>
</tr>
</tbody>
</table>

So: If \(\frac{F_0}{(1+r)^T} = S_0\) it costs nothing to set up this portfolio that has no payoff.

But: if \(\frac{F_0}{(1+r)^T} > S_0\) then I make money today with no future risk. (This is an arbitrage opportunity)

Note: If \(\frac{F_0}{(1+r)^T} < S_0\) then set up the opposite strategy to get an immediate payout with no future cost or risk.
INDEX ARBITRAGE

A strategy of monitoring future prices on a stock index and the value of the underlying stocks in the spot markets to exploit deviations from parity.

Program Trading - computer assisted monitoring of prices of financial assets. It typically involves the submission of numerous coordinated buy and sell orders to exploit index arbitrage or other financial strategies.

Cross Hedging - hedging something similar to your underlying position.

To hedge an equity portfolio

Number of contracts short = \( \frac{B_p \times V_p}{V_f} \)

\( B_p = \) beta of portfolio

\( V_p = \) value of portfolio

\( V_f = \) value of the futures.
Hedging Bond Risk

Number of Contracts Short = \( \frac{D_p \times V_P}{D_F \times V_F} \)

\( D_p = \) duration of Bond Portfolio
\( V_P = \) Value of Bond Portfolio
\( D_F = \) Duration of Futures
\( V_F = \) Value of the Futures

Recall: Duration is our measure of interest rate risk for Bonds