What are futures contracts?

A futures contract allows a trader to undertake a contract to accept or make delivery of a commodity or some kind of financial asset (a) in the future on a known date, (b) under specified conditions, (c) for a price contracted today.

The party to the contract who is agreeing to take delivery of the commodity is long in the position, whereas the party who is agreeing to deliver the commodity is short in the position. A speculator will benefit when she is long if the prices rise, short if the price falls.

Through submission of bids and asks, the exchange will match long orders with short orders, either with outside traders or with their own trades.
An example of a futures contract

On November 5, 2010, you could have agreed to pay $87.18 per barrel (42 gallons) for 1,000 barrels of light sweet crude oil (with 0.42% sulfur or less) for delivery at an agreed time during the month of December to a facility at Cushing, Oklahoma, F.O.B.

This contract was traded at the New York Mercantile Exchange (now CMEGroup), one of many futures exchanges in the United States.

Like options, you can speculate or hedge in this contract without taking delivery - you simply reverse your position before the last trading day.

Key terms

- **Spot price**: Today's cash price.
- **Futures price**: Today's price of a specified futures contract, like December 2010 NYMEX light sweet crude contract.
- **Expected future spot price**: Exactly what the name implies. (There is a theory that says that this price will not be the same as the futures price).
- **Volume**: The number of contracts traded today (or in any period of time).
- **Open interest**: The number of contracts that are "open," that exist right now, that have a matched long and short position.
- **e-Mini contract**: A much smaller contract in some commodity, typically electronically traded.
Types of Futures Contracts

- **Energies**: Oil, gasoline, diesel, heating oil, natural gas, ethanol
- **Currencies**: Euro, Pound, Yen, Peso, etc. (more than FOREX), mostly but not entirely priced in Dollars (called Crosses if not).
- **Financials**: Interest rate futures in mostly Dollar and Euro.
- **Indices**: Multiple stock indices of different countries.
- **Metals**: Aluminum, gold, palladium, platinum, copper, silver, uranium
- **Ag commodities**: Corn, wheat, soybeans, rice, coffee, oats, cattle, hogs, pork bellies, cotton, lumber, cocoa, milk, sugar, orange juice
- **Exotics**: Weather (heat), hurricane, snowfall, frost, economic event (statistical releases), commercial/residential real estate (see CMEGroup website for the exotics).

The exchanges

The primary futures exchanges in the U.S. were the New York Mercantile Exchange (NYMEX), the Chicago Board of Trade (CBOT), and the Chicago Mercantile Exchange (CME) and the New York Board of Trade (NYBOT). In 2007 the first three exchanges listed here were merged into the CMEGroup [NYSE: CME]. Globex, an electronic trading arm, is a division of the CMEGroup.

The huge, global IntercontinentalExchange [NYSE: ICE], which bought NYBOT in 2007, competes with the CMEGroup and emphasizes electronic trades. ICE trades energy futures through the U.K.-regulated London market, and its commodity, foreign exchange, and index futures through a U.S.-regulated market.

Formerly exchanges sold "seats" allowing members to trade on the exchange floor, called the "pit" and to bid and ask using a complicated system of hand signals and verbal orders in an "open outcry" system. This system is similar to that used on the NYSE.

Electronic trading is rapidly replacing open outcry. ICE is purely electronic.

Trades are cleared through a clearinghouse that matches buy and sell orders. The "clearing member" is a market maker who assures that all trades are matched, or matches it himself.
Web sites

Intercontinental Exchange (owns NYME): [http://www.theice.com](http://www.theice.com)

**CMEGroup (CME and CBOT): [http://www.cmegroup.com](http://www.cmegroup.com)**

Ino (good free site for checking prices): [http://www.ino.com](http://www.ino.com)

Kitco (metals): [http://www.kitco.com](http://www.kitco.com)

OpenECry (online futures broker – free practice account): [http://www.openecry.com](http://www.openecry.com)

Class assignment: Peruse the CMEGroup site before the next lecture and see what information they provide. Look at the list of commodities they trade and look at their contract specifications and prices.
CMEGroup Copper (HG) Dec 13 contract..

Sample CMEGroup Futures Contracts

<table>
<thead>
<tr>
<th>Size</th>
<th>Recent Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Sweet Crude</td>
<td>95</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>3.577</td>
</tr>
<tr>
<td>Wheat</td>
<td>7.062</td>
</tr>
<tr>
<td>Oats</td>
<td>3.114</td>
</tr>
<tr>
<td>No 11 Sugar</td>
<td>0.1797</td>
</tr>
<tr>
<td>E-mini S&amp;P 500</td>
<td>1767.75</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>1767.6</td>
</tr>
<tr>
<td>EUR/USD</td>
<td>1.3411</td>
</tr>
<tr>
<td>30-Year UST Bond</td>
<td>131.12</td>
</tr>
<tr>
<td>Gold GC</td>
<td>1281.0</td>
</tr>
<tr>
<td>Copper HG</td>
<td>3.262</td>
</tr>
<tr>
<td>Rainfall</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Quotes are in $, some contract quotations in cents. Prices are for November 11, 2013 or within a few days. Source: CMEGroup November 2013
A single contract, the December 2010 CMEGroup CLZO.

Futures price was $87.18 on 11/15/2010
Spot price was $86.49.

I use this 2010 example because multiple instructional examples in these lectures and the book are based upon this contract.

Example: NYMEX (CMEGroup) Light Sweet Crude Futures

Source: CMEGroup.com

Source: http://www.CMEGroup.com
What do we need to know about the Crude contract?

- **Contract size**
  - 1,000 bbls (42,000 gallons)
  - 1,000 bbls (42,000 gallons)

- **Pricing of quote**
  - $ per bbl

- **The exchange**
  - CMEGroup (formerly NYMEX)

- **Initial margin requirement** (.... back then)
  - $5,063 non-member, $3,750 member

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need to know ... (cont).

- **Maintenance Margin**
  - $3,750

- **Last trading date**
  - 3rd business day prior to the 25th day of the month in the preceding month of the contract (Nov 22 for Dec).

- **Delivery date or period**
  - By arrangement, anytime in the month of the contract.

- **Delivery location**
  - Various named locations in Cushing, Oklahoma or pipeline access to TEPPCO or Equilon Pipeline Co.
Margins and Leverage

- Initial Margin - The amount of cash per contract that you must have in your account prior to trading. ($5,063)
- Maintenance Margin - If the amount of cash per contract falls below this value, you will get a margin call and must replenish cash balance. ($3,750)
- Leverage (maximum) - The value of the contract divided by the initial margin.
  - $[87.18 \times 1000] / 5,063 = 17.22$ to 1
- Each penny move in the price of oil affects the margin account by $10.00$ per contract.

Settlement

Unlike options, futures are not paid for (which is to say, the commodity to be delivered is not paid for) until the delivery of the commodity.

The buyer of the future, however, is required to deposit funds in a special margin account which is, at the end of each day, adjusted to reflect the capital gain or loss. The starting required balance for this account is called the initial margin.

The seller is also required to maintain a margin account that is adjusted daily and if the seller does not own the commodity, may have to meet special requirements.

The account balance must always be kept above the maintenance margin, sometimes called the day margin.
An example of margin account adjustment

December crude oil futures contract, long 1,000 bbls

<table>
<thead>
<tr>
<th>Date</th>
<th>Price</th>
<th>Position</th>
<th>Gain</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>87.18</td>
<td>87,180</td>
<td>0</td>
<td>5,063</td>
</tr>
<tr>
<td>1</td>
<td>87.34</td>
<td>87,340</td>
<td>160</td>
<td>5,223</td>
</tr>
<tr>
<td>2</td>
<td>86.84</td>
<td>86,840</td>
<td>-500</td>
<td>4,723</td>
</tr>
<tr>
<td>3</td>
<td>86.12</td>
<td>86,120</td>
<td>-720</td>
<td>4,003</td>
</tr>
<tr>
<td>4</td>
<td>85.02</td>
<td>85,020</td>
<td>-1,100</td>
<td>2,903</td>
</tr>
<tr>
<td>5</td>
<td>86.44</td>
<td>86,440</td>
<td>1,420</td>
<td>4,323</td>
</tr>
<tr>
<td>6</td>
<td>87.66</td>
<td>87,660</td>
<td>1,220</td>
<td>5,543</td>
</tr>
</tbody>
</table>

For a short contract, the signs in the Gain would simply reverse.

Each one cent move affects margin by $10. Leverage is 17.22 to 1.

How you pay for delivery

(if you take delivery)

- If you go long (buy) on a futures contract for $87 (such as $87 per barrel of oil), and if you take delivery, you will end up paying $87 for the commodity.
- This net cost, however, will consist of two components:
  - the price you pay at delivery, which is spot for that day, and
  - the results of the daily adjustment to your margin account, whether a capital gain or capital loss.
- Therefore, you are effectively paying $87 because of the adjustment in your margin account.
Example

- In November, you buy an December Crude Oil future for $87.18 per barrel (nominal value $87,180). You are long. You want to take delivery.
- Spot price in on the day you enter this contract is $86.49 (not relevant to settlement nor to this contract).
- When Nov 22 arrives, spot price has risen to $91.50.
- Question: What are the settlement terms?
  - You take delivery of the oil in Dec at the Nov 22 spot ($91.50), not $87.18, so you pay $91,500.
  - You have gained $4,320 in your margin account.
  - The total cost of this contract to you is ($91,500 – 4,320) which equals $87,180, exactly as you intended.
- Therefore, the only asset you have is the cash balance of your margin account! (Relevant to delta ETFs).

Notes on these contracts

1. Short also
   - The previous example was for a long position (taking delivery or the equivalent). With futures, you are just as likely, and it is just as easy, to go short. With that position the trader makes delivery or the equivalent. In a spec position you benefit if the price goes down while you are in the contract.

2. Bid/Ask and limit orders
   - When you buy (long) or sell (short) a futures contract, you will pay close attention to the Bid/Ask queue, called the Depth of Market (DOM) queue, which is similar in structure to the NASDAQ Level II queue for stocks, and will likely use a limit order like you would do for stocks and options (see the OpenECry DOM for an example).

3. Implicit Leverage
   - Clearly with futures you have implicit leverage, which equals the value of the position divided by the initial margin. [Note the example in the second slide after this]. This leverage will clearly compound your gain or loss by the scale of the leverage. I now deemphasize this somewhat.
Example: Online DOM Interface (OpenECry)

This works the same way as Level II, except the Ask queue goes up instead of down (to higher prices, as it does in Level II).

Market orders can be traded directly and quickly from this screen.

Exiting the contract (offset)

Less than 1% of all futures contracts end with delivery of the commodity! Nearly all traders reverse their trades (called "offset") before the contract expiration date.

Remember that the futures price must converge to the spot price as the expiration date approaches. Open interest declines until it is zero.

Generally long positions exit at about the same pace as short positions, so open interest is gradually cleared off by the exchange.

Remember, you did not "buy" or pay for anything when you opened the contract. You agreed to daily settlement terms, which have been satisfied daily. When you offset you do not sell anything or get paid. You just inform your broker that you are closing out your trade and the exchange says goodbye.

Most ICE contracts allow either futures swaps (EFP) or cash settlement instead of delivery even if you do not offset. Many contracts are cash settlement only.

Many non-commodity contracts do not have deliverables so offset is automatic.
Pricing fundamentals of tangible, storable commodities (like oil)

The prices of tangible, storable commodities like crude oil, natural gas, wheat, copper, and so forth are fundamentally determined by global trends in **supply** (production), **demand** (consumption), and stored **inventory**, which acts as a buffer between supply and demand. Often futures prices, which have a short-run orientation (although they are influenced by long-run expectations) are strongly affected by unexpected inventory fluctuations.

Supply

Inventory

Demand

Energy Information Agency Data (weekly, monthly) on oil and nat gas influences prices greatly when expectations not met.


One of the most extreme futures contract moves ever was in the Jan 2009 Crude contract, which began it life at 60, soared to 145, then plunged to a little above 40. This contract was leveraged 7 to 1.

Massive profits on the short side.

Massive profits on the long side.

Source: ino.com
An interesting 2010 contract - sugar

Originally rose because of growing demand by developing nations and a severe shortage in China because of weather.

India announces better than expected sugar crop on same day that China raises interest rates to control growth.

Mudder Daniel Strenge was the largest sugar trader in the world (Cargill) when this contract was active.

112,000 pounds, notional value $37,000 @ .33, $29,355 @ .2621
Maint Margin $2,000  Initial Margin $2,200 (Nov 2010)

Copper goes stratospheric in 2010

For a global commodity like this, when the $ weakens, then the dollar price of key global commodities will tend to rise. This is one of the inflationary side effects of policies like QE2.