# Unit 10. Commodity and Financial Futures

Reading: Chapter 19

## Chap. 19. Commodities and Financial Futures

1. The mechanics of investing in futures
2. Leverage
3. Hedging
4. The selection of commodity futures contracts
5. The pricing of futures
6. Non-commodity futures - Financial futures and currency futures
7. Swaps

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## Difference Between Futures and Options

- A futures contract gives the holder the obligation to make or take delivery under the terms of the contract, whereas an option grants the buyer the right, but not the obligation, to establish a position previously held by the seller of the option.
- To exit the commitment prior to the settlement date, the holder of a futures position has to offset his/her position by either selling a long position or buying back (covering) a short position, effectively closing out the futures position and its contract obligations.

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## Commodity and Financial Futures

- There can be futures for commodities (wheat, coffee, etc.) and financial assets (stocks, treasury bills, etc.)
- There are two parties involved in a futures contract.
  - Speculators: investors seeking to make a lot of money by taking a lot of risk because of the leverage inherited in futures investments.
  - Hedgers: producers or assets holders seeking to reduce the risk of loss through price fluctuation.
- A futures contact is a formal agreement for either the delivery (seller) or the receipt (buyer) of a particular quantity of a particular commodity at a specified month for a specified price.

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## 1. The Mechanics of Investing In Commodity Futures

- Over fifty commodities are traded on then exchanges in the U.S. and Canada, like the CME Group Inc. (http://www.cme.com), which is the world's largest futures exchange.
- The commodities typically have the following features:
  - (1) sufficient demand and supply and no monopoly.
  - (2) easily stored so a supply of commodity can come continuously to the market.
  - (3) "fungible" so that you cannot tell one from another (e.g., a bushel of a particular type of wheat is the same as another bushel of the same kind ).
- Commodity futures contract are purchased or sold through brokers. Although there is a buyer and a seller, the actual contract is made between the individual and the exchange.

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## Prices and Positions

- Two prices:
  - Futures price: the price in a contract for the future delivery of a commodity.
    - E.g., If the contract is for delivery in six months at $3.50 per bushel of a particular wheat, then $3.50 is the futures price.
  - Spot price: the current price of a commodity.
    - E.g., If currently the market price for a bushel of this wheat is $3.40, then the spot price is $3.40.
    - When you read quotes the spot price is the present price or the price of the commodity that is CLOSEST to being delivered.
- Speculators buy or sell contracts in anticipation of price changes. There are two positions an investor can take:
  - Long position: The investor purchases a futures contract in anticipation of price increases.
  - Short position: The investor sells a futures contract in anticipation of price decreases.



## Closing a Futures Contract

- While deliveries of goods happens sometimes, such deliveries occur infrequently.
- The losses and profits are usually generated without the goods being delivered.
- One closes a position in a futures contract by entering into the opposite position
  - A contract to sell "offsets" a contract to buy.
  - A contract to buy "offsets" a contract to sell.



## Units of Trading

- To facilitate trading, contracts are uniform.
- The units of trading vary with each commodity, but all of them are very large quantities.
- Below is a list of exchanges and standard trading units for selected commodities.

EXHIBIT 21.1 Selected Commodities, Their Markets, and Their Units of Trading

| Commodity | Market | Unit of One Contract |
|---|---|---|
| Corn | Chicago Board of Trade | 5,000 bushels |
| Soybeans | Chicago Board of Trade | 5,000 bushels |
| Cattle | Chicago Mercantile Exchange | 40,000 pounds |
| Coffee | New York Board of Trade | 37,500 pounds |
| Copper | COMEX (Div. of New York Mercantile Exchange) | 25,000 pounds |
| Platinum | New York Mercantile Exchange | 50 troy ounces |
| Silver | COMEX (Div. of New York Mercantile Exchange) | 5,000 troy ounces |
| Lumber | Chicago Mercantile Exchange | 110,000 board feet |
| Cotton | New York Board of Trade | 50,000 pounds |



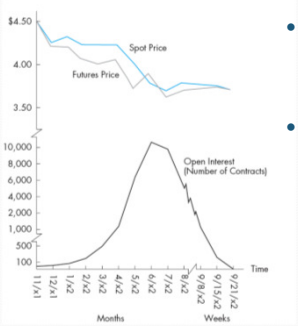
## Reporting of Futures Trading

- Reporting is similar to stock and bond trade reporting. The table below is from http://futuresource.quote.com/markets/market.jsp?id=grain
- Note the textbook example also has the "open interest" reported, which is the number of future contracts in existence for a particular commodity.

| | Symbol | Contract | Month | Time | Last | Chg | Open | High | Low |
|---|---|---|---|---|---|---|---|---|---|
| | S X8 [10] | SOYBEANS (DAY) | Nov '08 | 13:42:54 | 911'6s | 12'2 | 917'0 | 917'0 | 900'0 |
| | SM Z8 [10] | SOYBEAN MEAL (DAY) | Dec '08 | 13:42:53 | 271.7s | 8.9 | 266.5 | 271.9 | 265.0 |
| | BO Z8 [10] | SOYBEAN OIL (DAY) | Dec '08 | 13:42:54 | 33.90s | -0.27 | 34.60 | 34.75 | 33.70 |
| | C Z8 [10] | CORN (DAY) | Dec '08 | 13:42:53 | 375'4s | -2'4 | 382'0 | 387'0 | 375'0 |
| | O Z8 [10] | OATS (DAY) | Dec '08 | 13:42:54 | 234'4s | -3'4 | 245'0 | 245'0 | 236'0 |
| | W Z8 [10] | WHEAT (DAY) | Dec '08 | 13:42:54 | 521'0s | -1'4 | 522'0 | 529'0 | 515'0 |
| | RR X8 [10] | ROUGH RICE (DAY) | Nov '08 | 13:43:09 | 1517.0s | -7.0 | 1517.0 | 1517.0 | 1517.0 |
| | KW Z8 [10] | WHEAT (DAY) | Dec '08 | 13:25:58 | 568'0s | 5'0 | 568'0 | 570'2 | 560'4 |
| | MW Z8 [10] | HARD RED SPRING WHEAT(DAY) | Dec '08 | 12:05:47 | 640'0 | 6'0 | 640'0 | 642'0 | 636'0 |
| | RS X8-WC [10] | RAPESEED (CANOLA) | Nov '08 | 13:47:18 | 425.7 | 1.5 | 425.7 | 425.7 | 425.7 |
| | T X8-ENC [15] | WHEAT | Nov '08 | 22:30:47 | 91.0000 | -0.2000 | 91.0000 | 91.0000 | 91.0000 |
| | EBM X8-ENC [15] | MILLING WHEAT #2 | Nov '08 | 23:30:45 | 140.00 | -1.00 | 141.00 | 141.00 | 139.50 |
| | ECO G9-ENC [15] | RAPESEED | Feb '09 | 23:31:02 | 330.00 | -0.50 | 329.00 | 330.50 | 328.75 |



## Spot and Futures Prices and Open Interest for a September Contract for Kansas City Wheat




- Futures price can be higher than, equal to, or lower than the spot price.
- The open interest (# of futures contracts in existence) exhibits an inverse-U pattern over the life of the contract.



## Regulation of Commodity Markets

- The commodity markets is regulated by the Commodity Futures Trading Commission (http://www.cftc.gov).
- The Commission
  - Establishes uniform standards for each commodity.
  - Controls over trading procedures, the hours of trading, and the maximum allowable daily price movements.
  - Does not protect investors from their own folly.

## 2. Leverage

- Futures offer large profits and losses and are thus very risky.
- The source of the leverage: the small margin requirement
- The margin requirement represents only a very small percentage of the value of the contract, much smaller compared to stock investments covered in previous units.

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## Margin

- Margin is a good faith deposit required of both the long position and the short position to protect the exchange and the broker and to guarantee the contract.
- While this margin has the same type of leverage function, it is different from the margin in stock investment.
  - In stock and bond investment margin represents the investor's equity in the position.
  - In commodities futures margin is a deposit to show investor's good faith. There is no equity to speak of at the time of getting into the contract.
  - In stock and bond investment, the amount of margin required varies with the price of the security.
  - In commodities futures each contract has a fixed minimum margin requirement that is established by the commodities Futures Trading Commission.

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## Margin Call and Maintenance Margin

- Margin call is a request by a broker for an investor to place additional funds in an account when the level in the account goes below the minimum margin requirement.
- E.g., The margin requirement for wheat is $1,000 and the minimum margin is $750.
  - An investor initially put in $1,000 to enter into a wheat futures contract.
  - If the value of the contract declines by $200, the investor loses $200 but will not receive a margin call because the balance is till more than the minimum margin of $750.
  - If the value of the contract declines by another $200 for a total of $400, the investor's account balance is now $600. The investor receives a margin call. The investor needs to deposit $400 to restore the account to $1,000.
  - If the value of the contract increases so the investor has $1,300 in his account, he can withdrawal the $300 and use it for other purposes.
- Margin call and maintenance margin apply to both buyers and sellers.

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## Marking to the Market

- Futures positions are "marked to the market" daily, in that gains and losses are figured out daily and funds are transferred between accounts.
- Futures prices are allowed to change only by the "daily limit", which is set by the Commission.

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## An Example of Investing in Futures

- The futures price of gold is $650. Futures contracts are for 100 ounces of gold, and the margin requirement is $5,000 a contract. The maintenance margin requirement is $1,500. You expect the price of gold to rise and enter into a contract to buy gold.
- a) How much must you initially remit?
  - The speculator remits the margin requirement: $5,000.
- b) If the futures price of gold rises to $655, what is the profit and percentage return on your position?
  - If the price of gold rises to $655,
  - The contract is worth: $655 x 100 = $65,500.
  - The profit is $65,500 – 65,000 = $500
  - The percentage gain is the profit divided by the amount committed (the margin): $500/$5,000 = 10%.
  - Note that for less than a 1% increase in the price of gold, the speculator earns 10%.

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## An Example of Investing in Futures – Cont'd

- c) If the futures price of gold declines to $648, what is the loss and percentage return on the position?
  - If the price of gold declines to $648
  - The contract is worth: $648 x 100 = $64,800.
  - The loss is $64,800 – 65,000 = ($200)
  - The percentage loss is ($200)/$5,000 = (4%).
- d) If the futures price of gold falls to $632, how much do you have in your margin account, and will you receive a margin call?
  - At $632 the value of the contract is $63,200
  - The loss is $1,800.
  - You have $5,000 - $1,800 = $3,200 in your margin account.
  - Since $3,200 exceeds the maintenance margin requirement you will not receive a margin call.
- e) How do you close your position?
  - You close the long position by entering into an offsetting contract, that is, you enter into a comparable contract to sell gold.

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## 3. Hedgers

- One major reason for the development of commodity futures markets was the desire of producers to reduce the risk of loss through price fluctuations.
- The procedure for this reduction in risk is called hedging, which consists of taking opposite positions at the same time.
- Hedgers pass the risk of loss to speculators.
- In exchange for the reduced risk, hedgers forego the possibility of a large return.

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## An Example of Currency Hedging

- You expect to receive a payment of 1 million British pounds after six months for your business. The pound is currently worth $1.60 (i.e., £1=$1.60), but the six-month futures price is $1.56. You expect the price of pound to decline. If this expectation is fulfilled, you will suffer a loss when the pounds are converted into dollars when you receive them six months in the future.
- a) Given the current price, what is the expected payment in dollars?
  - Payment in terms of the spot price:1,000,000 x $1.60 = $1,600,000
- b) Given the futures price, how much would you receive in dollars?
  - Payment in terms of the futures price: 1,000,000 = $1,560,000
- c) If, after six months, the pound is worth $1.35, what is your loss from the decline in the value of the pound?
  - If the price of the pound declines to $1.35, the recipient receives pounds worth $1,350,000. The loss from the decline in the value of the pound form $1.60 to $1.35 is $250,000 (i.e., $1,350,000 - $1,600,000).

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## An Example of Currency Hedging – Cont'd

- d) To avoid this potential loss, you decide to hedge and sell a contract for the future delivery of pounds at the going futures price of $1.56. What is the cost to you of this protection from the possible decline in the value of the pound?
  - To hedge, you sell (shorts) a contract for the future delivery of pounds. The value of that contract is $1,560,000 based on the future price of $1.56. When you receive the pounds after six months, you can deliver the pounds at the price specified in the contract. The cost of the hedge is the difference between the spot and futures prices times the number of pounds: ($1.60 - $1.56)(1,000,000) = $40,000.
- e) If, after the hedging, the price of the pound falls to $1.35, what is the maximum amount that you lose?
  - Since the investor has a contract to sell pounds at $1.56, the price decline is irrelevant. The loss (the cost in part d) remains $40,000 because the investor hedged. In (c) you did not hedge and, therefore, were exposed to the larger loss.

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## An Example of Currency Hedging – Cont'd

- f) If, after the hedging, the price of the pound rises to $1.80, how much do you gain from your position?
  - Since the investor has a contract to sell pounds at 1.56, the price increase is irrelevant. By hedging, the investor has foregone the opportunity for profit that would result from an increase in the value of the pound.
- g) How would your answer be different to part (6) if you had not hedged and the price of the pound had risen to $1.80?
  - If the investor had not hedged, 1,000,000 pounds would be worth $1,800,000. The investor earns a $200,000 profit on the increase in the value of the pound from $1.60 to $1.80. However, the intent of the hedge is to reduce the risk of loss from a price decline. To achieve risk reduction, the hedger must forgo the opportunity for profit. Any profit goes to the speculator who buys the contracts and bears the risk.

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## 4. The Selection of Commodity Futures Contracts

- As with the selection of securities, there are two basic methods of selecting futures contracts.
  - Technical approach
    - averages, charts, and graphs used to identify current price movements and predict future price movements
  - Fundamental approach
    - concerned with factors affecting the demand for and supply of various commodities

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## 5. Futures Pricing and Price Disclosure

- Factors affect futures pricing
  - Spot price
  - Investor expectations of rising or falling prices
- Futures prices generally exceed spot prices.
- The current futures price may reveal a consensus concerning anticipated prices in the future.
- The process of using futures prices as a forecasting tool is referred to as "price disclosure".

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## An Example of Using Futures Prices as Price Disclosure

- Suppose the current price of gold is $350 but you expect the future price to rise to $400.
- A) If the futures price were $390, what would you do?
  - If you expect the price of gold to rise from $350 to $400, you would want a long position in the futures contract. If the futures price were $390, you would enter a contract to buy at $390.
- B) If your expectation is fulfilled, what is your profit?
  - If your expectation is fulfilled, you could buy the gold through the contract for $390 and sell it for $400. The purchase and sale earns $10. (Of course, if the expectation is not fulfilled and the price is less than $390, you sustain a loss since you must buy the gold for $390.)

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## An Example of Using Futures Prices as Price Disclosure – Cont'd

- C) If the futures price were $418, what would you do?
  - If the futures price were $418, you would reverse the process and sell (short) the futures. If your expectation is fulfilled, you could buy the gold for $400 and deliver it through the contract for $418 and make $18. (Of course, if the expectation is not fulfilled and the price exceeds $418, you sustain a loss since you must buy the gold for more than $418 and sell it for $418.)
- D) What futures price will cause you to take no action? Why?
  - If the futures price were $400, you would take no action since the futures price and the expected price are the same.

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## 6. Non-Commodity Futures

- On the topic of hedging, the example I give is not a commodity hedging, but a currency hedging. In the futures markets, in addition to commodity futures, there are
  - Financial futures
    - contracts for the future delivery of a financial asset
  - Currency futures
    - contracts for the future delivery of a currency

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## Stock Index Futures

- Based on an index of stock prices
- Speculators buy and sell stock index futures in anticipation of changes in stock prices.
- Portfolio managers use stock index futures to hedge against movements in stock prices.

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## An Example of Financial Futures

- You expect the stock market to decline, but instead of selling stocks short, you decide to sell a stock index futures contract based on an index of New York Stock Exchange common stocks. The index is currently 600 and the contract has a value that is $250 times the amount of the index. The margin requirement is $2,000 and the maintenance margin requirement is $1,000.
- A) when you sell the contract, how much must you put up?
  - You must remit the margin requirement: $2,000.
- B) What is the value of the contract based on the index?
  - The value of the contract based on the index: 600 x $250 = $150,000
- C) If after one week of trading the index stands at 601, what has happed to your position? How much have you lost or profited?
  - The value of the contract is 601 x $250 = $150,250.
  - Since you entered into a short position, you have lost $250 (i.e., $150,000 - $150,250).

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## An Example of Financial Futures – Cont'd

- D) If the index rose to 607, what would you be required to do?
  - If the index rises to 607, the value of the contract is $151,750. Your margin has been reduced to $250, because you have lost $1,750. The margin requirement of $2,000 must be restored, so you will have to remit an additional $1,750
- E) If the index declined to 594 (1% from the starting value), what is your percentage profit or loss in your position?
  - If the index is 594, the value of the contract is 594 X $250 = $148,500. You have made a profit of $1,500 ($150,000 - $148,500), a 75% return on the funds committed (i.e., $1,500/$2,000).
- F) If you had purchased the contract instead of selling it, how much would you have invested?
  - The margin requirement is the same for long and short positions: $2,000.

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## An Example of Financial Futures – Cont'd

- G) If you had purchased the contract and the index subsequently rose form 600 to 607, what would be your required investment?
  - If you bought the futures contract and the value of the index rose to 607, the value of the contract rises to $151,750. No additional margin is required, and you may remove $1,750 from the account, which restores the margin back to $2,000.
- H) Contract answers to parts d) and g)
  - In (d) you lost funds, which means additional margin is required. In (g) you made a profit and may remove funds.

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## Programmed Trading and Index Arbitrage

- The creation of stock index futures and the rise of programmed trading have resulted in stock index arbitrage.
  - Remember arbitrage refers to the simultaneous establishment of long and short positions to take advantage of price differentials between two markets.
- When the value of a stock index futures deviate s from the value of the underlying stocks in the index, an opportunity for arbitrage is created.
  - If the value of the contract exceeds the value of the underlying shares, arbitragers will short the contracts and buy the shares
  - If the value of the contract is less than the value of the underlying shares, arbitragers will buy the futures and sell the shares.

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## Programmed Trading and Index Arbitrage

- The transactions are done simultaneously through the use of computers that are programmed to enter the buy and sell orders when a divergence between the stock index futures and the actual stock index develops.
  - This kind of divergence usually exists for a very short time (in a matter of a couple of hours) so timing is of essence. Without programmed trading investors probably would not be able to detect such divergence and enter orders simultaneously in such a short time period.
- The combining of stock index futures and programmed trading links the securities and futures markets.
- This linkage has resulted in significant swings in the prices of individual stocks when the arbitrageurs enter large numbers of buy or sell order.

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## Illustration of Programmed Trading and Index Arbitrage Opportunities


- The graph above illustrates price differentials and opportunities for programmed trading for index arbitrage.

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## 7. Swap Agreements

- A "swap" agreement is a contract in which the two parties trade payments.
- Swap agreements are not a method to increase profits but a means to manage risk, especially exchange rate or interest rate risk.
- There are several different kinds of swaps:
  - Currency swap
  - Interest rate swap
  - Equity swap

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## Currency Swap and Interest Rate Swap

- Currency swap
  - A firm with operations in a foreign country may swap payments with a firm in that country to avoid having to convert one currency to another.
  - These swap agreements are often used by multinational companies to manage exchange rate risk.
- Interest rate swap
  - A firm that is required to make fixed payments but would prefer to make variable payments may swap the fixed payments with a firm that is obligated to make variable payments. As a result of the swap both firms may be better able to match their cash flows with the required payments.

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## Equity Swap

- In an equity swap, two parties may swap payments based on a stock price index.
- Sometimes investors may want to alter their portfolios from equity to debt or vice versa.
- However such portfolio changes may result in large transaction costs and tax consequences.
- As an alternative, two parties may swap payments based on stock price indices.
- Swap payments are made based on the extent to which the price indices differ.

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"Trade you my Doggie Cola for your Toilet Water Drink Box."

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