
Detailed description of how the Futures Markets work
Review of Margins

**Problem**: Investor enters into two long July futures contracts on orange juice. Each contract for the deliver of 15,000 pounds. The current futures price is 160 cents per pound, the initial margin is $6000 per contract, and the maintenance margin is $4,500 per contract. What price change would lead to a margin call?

\[
[1.60 - x] \times 15,000 = 1500 \quad x = 1.50
\]

or the price drops 10 cents.

Under what circumstances could $2000 be withdrawn from the margin account?

\[
[x - 1.60] \times 15,000 = 2000 \quad x = 1.7333
\]

or the price rises 13 cents.
Problem: Suppose at the end of one day a clearinghouse member is long 100 contracts, and the settlement price is $50,000 per contract. The original margin is $2000 per contract. On the following day the member becomes responsible for clearing an additional 20 long contracts, entered into at a price of $51,000 per contract. The settlement price at the end of this day is $50,200. How much does the member have to add to its margin account with the exchange clearinghouse?

- Initial margin requirement is $2000 \times 20 = $40,000.

- The gain is $50,200 - $50,000 = $20,000 on the existing contracts.

- There is also a loss of $51,000 - $50,200 = $16,000 on the new contract.

- The member is responsible for adding to the account

\[ $40,000 - $20,000 + $16,000 = $36,000. \]
Types of Traders

- **Commission brokers** - follow the instruction of their clients and charge a commission to do so.

- **Locals** - trade on their own account.

- **Individuals** taking positions, in either case, can be categorized as Hedgers, Speculators, and Arbitrageurs.

- **Speculators** can be classified as Scalpers, Day Traders, or Position Traders.

  - **Scalpers** look for very short-term trends and attempt to profit from small changes in the contract price.

  - **Day Traders** hold their position for less than one trading day. Unwilling to take risks that adverse news will occur overnight.

  - **Position Traders** hold their positions for much longer periods of time. Hope to make profits from major shifts in the market.
Types of Orders

- **Market Order** - requests a trade immediately at the best available price.

- **Limit Order** - specifies a price. The order will be made only at this (or at a better) price. Example: a limit order at $50 for a short position will be executed only at a price of $50 or greater. *No guarantee* that the order will occur.

- **Stop Order** or **Stop-loss Order** - specifies a price. The order will be made once a bid or offer is made at that particular price (or a less favorable price). Example: a stop order to sell at $40 is issued when the market price is $55. The order becomes a **market order** once the specified price has been struck. Useful to **close out** positions when market conditions become unfavorable. *Insurance* from drastic changes.
Types of Orders, cont.

- **Stop-Limit Order** - combines a **limit order** and a **stop order**. Order becomes a limit order once a bid or offer is made at a price equal to or less favorable than the stop price. Two prices are specified - the stop price and the limit price. Example, suppose the market price is $35, a stop-limit order to buy is issued with a stop price of $40 and a limit price of $41. Once a bid or offer at $40, the stop-limit becomes a limit order at $41. If the the stop price and the limit price are equal, the order is called a **stop-and-limit order**.

- **Market-If-Touched (MIT) Order** or **Board Order** - is executed at the best available price after a trade occurs at a specified price or at a price more favorable than the specified price. An MIT becomes a market order once the specified price is struck. Designed to ensure that profits are taken if sufficiently favorable price movements occur.
Types of Orders, cont.

- **Discretionary Order** or **Market-Not-Held Order** - is a market order except that execution may be delayed at broker’s discretion in order to get a better price.

- **Time-Of-Day Order** - specifies a particular period of time during the day when the order can be executed.

- **Open Order** or **Good-Till-Canceled Order** - is in effect until execution or the end of trading in the particular contract.

- **Fill-or-Kill Order** - must be executed immediately on receipt or not at all.
Regulatory Bodies

- **Commodity Futures Trading Commission (CFTC)** regulates the futures markets
- The CFTC licenses futures exchanges and approve contracts
- All contracts and changes to existing contracts must be approved - to gain approval the contract must have useful economic purpose (serves both hedgers and speculators)
- Responsible for ensuring that prices are communicated to the public
- Ensures that futures traders report outstanding positions above specified levels
- Licenses all individuals involved in providing futures trading services
- Investigates complaints by the public
Regulatory Bodies, cont.

• National Futures Association (NFA) is an independent organization of individuals who participate in futures markets

• NFA works to prevent fraud and ensure that the market operates in the best interest of the public

• Settles disputes through arbitration

• Securities and Exchange Commission (SEC), Federal Reserve Board, and the US Treasury Department additionally participate in regulating the futures markets.

• Especially in the connection with treasury bills & bonds and stock futures.
Trading Irregularities

- Investor groups corning the market -
  - Group takes very large long position and attempts to manipulate the access of the underlying asset
  - As delivery date approaches - group retains the long position so outstanding futures contracts may exceed the amount of the commodity available for delivery.
  - Short position may panic due to difficulty in delivering the asset and close the position for a lower price. Causes a rise in the long and spot contract prices.

- Regulators prevent the practice by (a) limiting the size of positions, (b) increasing margin requirements, (c) preventing such trades, or (d) requiring participants to close out positions

- Other irregularities include traders overcharging investors, not paying full proceeds, and front-running

- Front-running trades are by traders who make trades for themselves using knowledge of future customer orders
General background:

• Accounting standards: market value of a contract is recognized unless the contract qualifies as a hedge, in which case it recognizes hedge accounting.

• Hedge accounting recognizes gains and losses at the time of the closing of a position, instead of during the accounting year. Useful for tax purposes.
Hedge Accounting

Example:

- Company with December year end. In September 2004 the company takes a long position in March 2005 corn futures contract and closes out the position at the end of Feb. 2004.

- Suppose that futures prices 250 cents per bushel when the contract is entered, 270 cents per bushel at the end of 2004, and 280 cents per bushel when the contract is closed out. The contract is for the delivery of 5000 bushels.

- If the contract does not qualify as a hedge, the gains are

\[
5000 \times [\$2.70 - \$2.50] = \$1000
\]

in 2004 and

\[
5000 \times [\$2.80 - \$2.70] = \$500
\]

in 2005.
Hedge Accounting

- On the other hand if the account is for hedging purposes, then the entire $1500 gain is realized in 2005 (for accounting purposes).

- The aim of the hedging account is to pay as close to $2.50 as possible in February 2005.
Gains (losses) are considered capital gains or ordinary income.

- Corporate capital gains are taxed at the same rate as ordinary income; however, corporate capital losses can be deducted only from capital gains.

- Corporate capital losses can be carried back three years and carried forward five years.

- Noncorporate short term capital gains are taxed at the same rate as ordinary income, but noncorporate long term capital gains are taxed at a maximum rate of 15%.

- Capital gains are long term if they are held for longer than one year.

- Noncorporate capital losses can be deducted from capital gains plus ordinary income (up to $3000). Can be carried forward indefinitely.
For tax purposes futures contracts are treated as if they are closed out on the last day of the tax year.

Noncorporate taxpayers consider 60% as long term and 40% as short term capital gains / losses.

Hedging transactions are exempt from the rule.
- Reduce the risk of price changes or currency fluctuations with respect to property that is held by the taxpayer in order to produce income
- Reduce risk of price or interest rate changes or currency fluctuations with respect to borrowings made by the taxpayer

Hedging transactions must be identified before the end of the day when the transaction is entered into & the asset must be identified within 35 days

Gains or losses are treated as ordinary income
### Forward vs. Futures Contracts

<table>
<thead>
<tr>
<th>Forward</th>
<th>Futures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private contract between two parties</td>
<td>Traded on an exchange</td>
</tr>
<tr>
<td>Not standardized</td>
<td>Standardized contract</td>
</tr>
<tr>
<td>Usually one specified delivery date</td>
<td>Range of delivery dates</td>
</tr>
<tr>
<td>Settled at end of contract</td>
<td>Settled daily</td>
</tr>
<tr>
<td>Delivery or final cash settlement</td>
<td>Contract is usually closed out</td>
</tr>
<tr>
<td>usually takes place</td>
<td>prior to maturity</td>
</tr>
<tr>
<td>Some credit risk</td>
<td>Virtually no credit risk</td>
</tr>
</tbody>
</table>

- Suppose the exchange rate for Sterling for a 90-day contract is 1.6000 and the rate is also the futures price for a contract that will be delivered in exactly 90 days. What is the difference between the gains and losses?

- Under the forward contract, the entire gain or loss is realized at the end of the life of the contract.

- Under the futures contract, the entire gain or loss is realized day-by-day because of **marking to market** or daily settlement.
Foreign Exchange Quotes

- Forward and Futures contracts are traded in foreign currencies:
- Futures are quoted as number of US dollars per unit of foreign currency
- Forward prices are always quoted in the same way as spot prices
- Example: for yen, Australian dollar, etc.. the forward quotes show number of units of foreign currency per US dollar.
Summary

- High proportion of futures contracts do not lead to delivery.

- The possibility of delivery determines the futures price.

- Futures contracts contain a period of days during which the delivery can be made (specified by the exchange). Some contracts are settled in cash as opposed to assets (such as stock indices).

- Specifications of futures contracts are determined by the exchange. They contain the asset, where the asset will be delivered, when it will be delivered, trading hours, way in which prices are quoted, price limits, etc...

- New futures must be approved by Commodity Futures Trading Commission.
Summary, cont.

- Margins provide insurance that contracts will be honored.

- Margin accounts are kept by an investor with his/her broker. The account is adjusted daily to reflect gains or losses.

- If the margin account drops below the maintenance margin, the investor must provide variation margin or the contract will be closed out.

- The broker must be a clearinghouse member or maintain a margin account through a clearinghouse member. The clearinghouse margin is adjusted daily to reflect the clearinghouse member’s gains or losses.
Forward contracts differ from futures contracts in that:

• Forward contracts are private arrangements between two parties - futures contracts are traded on exchanges

• Forwards usually have one delivery date - futures usually contain frequent delivery dates

• Forwards are not settled until delivery date (and usually delivered) - futures are settled daily (and usually not delivered)

• Forwards are not necessarily standardized - futures are standardized by the exchange and CFTC
Hedging Strategies Using Futures

A perfect hedge is one that completely removes risk - rare. Instead we consider strategies that do not need to be adjusted (hedge-and-forget, Hull).

Example:

• Consider a company that will gain $200,000 for each 1% increase in the price of the commodity over the next three months - likewise will $200,000 for each 1% decrease.

• To hedge the company should take a short futures position to offset the risk of losses. The position should lead to a loss of $200,000 for each 1% increase in the price of the commodity over the next three months and a gain of $200,000 for each 1% decrease in the price.

• If the price ↓ then the gain in futures position offsets loss on rest of companies business.

• If the price ↑ then the loss in the futures position is offset by the gain in rest of the companies business.
### Short hedge strategies

**Short hedge** involves a short position in future contracts.

- Useful if the hedger already owns the asset (as described above)

- Useful if the hedge plans to own the asset in the near future - example:
  - A US exporter knows that she will receive euros in 6 months.
  - The exporter will realize a gain if the euro increases in value relative to dollars and a loss if the euro decreases in value to the dollar.
  - Short futures position leads to a loss if euros ↑ and leads to a gain if the euro ↓
  - The short position offsets the exporter’s risk
Short hedge strategy, cont.

Detailed example: May 15.

- Oil producer negotiates a contract to sell 1 million barrels of crude oil. The price will be apply in the contract is the market price on August 15.

- The producer is in the position to gain $10,000 for each 1 cent increase in the price of oil over the next three months and lose $10,000 for each 1 cent decrease in the price.

- Suppose on May 15 the spot price is $19 per barrel and the crude oil futures price on NYMEX (New York Mercantile Exchange) for August delivery is $18.75 per barrel.

- Each futures contract on NYMEX contains 1000 barrels for delivery, so the producer can hedge by shorting 1000 futures contracts.

- If the producer closes out its position on August 15, the effect of the strategy should be to lock in a price close to $18.75.
Short hedge example, cont.

What might happen?

• Suppose the spot price on August 15 is $17.50 per barrel then the company earns $17.5 million for the forward contract. Furthermore, the short futures contract earns

\[
[18.75 - 17.50] \times 1,000,000 = 1.25 \times 1,000,000 = 1,250,000.
\]

Therefore, the company earns $18.75 million.

• Suppose the spot price on August 15 is $19.50 per barrel then the company earns $19.5 million for the forward contract. The short futures contract loses

\[
[19.50 - 18.75] \times 1,000,000 = 0.75 \times 1,000,000 = 750,000.
\]

Therefore, the company earns $18.75 million.

• In fact in all cases the company earns $18.75 million.
Long hedge strategies

Hedges that take a long position are known as long hedges. It is used when a company knows it will need to purchase a certain asset in the future and wants to lock in a price now.

- Example: suppose today is January 15. Consider a wire manufacturer that will need to buy 100,000 pounds of copper on May 15.

- The spot price of copper is 140 cents per pound, and the futures price for May delivery is 120 cents per pound.

- The manufacturer can hedge its position by taking a long position in four May futures contracts on the COMEX division of NYMEX and closing its position on May 15. Each contract contains 25,000 pounds for delivery. We will see the strategy locks in the price close to 120 cents per pound.
Long hedge strategy, cont.

What might happen?

- Suppose the price of copper on May 15 is 125 cents per pound. Then
  \[100,000 \times [\$1.25 - \$1.20] = $5000\]
  so the manufacturer gains $5000 over a spot transaction.

- Suppose the price of copper on May 15 is 105 cents per pound. Then
  \[100,000 \times [\$1.25 - \$1.05] = $15,000\]
  so the manufacturer loses $15,000 over a spot transaction.

- Better to use futures contract than to engage a spot transaction in January due to costs incurred from storage and loss of interest by paying 4 months earlier.
Long hedge strategies, cont.

- Can use long hedge strategies to manage existing short hedges.

- Example - shorting a particular stock while taking a long position in a stock index fund. If major market climb, then prevent a loss in the particular stock.

- Daily settlement does affect the performance of a hedge.

- Hedging provides insurance for manufacturers and producers from unforeseen fluctuations. Avoid unpleasant surprises.
Hedging and competitors

- If hedging is not practiced in a particular industry, then it may not make sense to practice hedging.
- In some industries prices of fluctuate to reflect the cost of the raw materials.
Example:

• Assume that two companies ChanceCo and SafeCo produce gold jewelry. Further, assume that ChanceCo does not hedge against price fluctuations of raw gold, but SafeCo decides to engage in long positions to hedge against movements in the price of gold.

• If raw gold price ↑ then ChanceCo sets the price of gold jewelry ↑. The corresponding profit margin is →. SafeCo’s profit margin will ↑ (considering the hedge).

• If raw gold price ↓ then ChanceCo sets the price of gold jewelry ↓. The corresponding profit margin is →. SafeCo’s profit margin will ↓ (considering the hedge).

<table>
<thead>
<tr>
<th>Change in gold price</th>
<th>Effect on price of gold jewelry</th>
<th>Effect on profits of ChanceCo</th>
<th>Effects on profits of SafeCo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>Increase</td>
<td>None</td>
<td>Increase</td>
</tr>
<tr>
<td>Decrease</td>
<td>Decrease</td>
<td>None</td>
<td>Decrease</td>
</tr>
</tbody>
</table>
Hedging and competitors, cont.

It's possible that SafeCo could have negative profits if the price drops too much.

- Hedging futures contracts can increase/decrease a company’s profits relative to a position it would be in without the hedge.

- If the price of oil drops, then the company buying the short position offsets the loss

- If the price of oil rises, then the company’s profits will be less than if there was no short futures contract. This can result in a net loss.

- If the shareholders do not understand hedging then there can be trouble when the company underperforms the market due to hedging.
Basis Risk

Hedging not quite straightforward, since:

- The asset whose price is to be hedged may not be exactly the same as the asset underlying the futures contract.
- The hedger may be uncertain as to the exact date when the asset will be bought or sold.
- The hedge may require the futures contract to be closed out before its delivery month.

These reasons give rise to basis risk.
The Basis

We define the basis as

\[ \text{Basis} = \text{Spot price of the asset to be hedged} - \text{Futures price of contract used} \]

- If the asset being hedged is the same as the asset underlying the futures contract, the basis should be zero at the expiration of the futures contract.

- Prior to expiration, the basis may be positive or negative. The spot price should equal the futures price for a very short maturity contract.

- When the spot price increases by more than the futures prices, the basis increases - called strengthening of the basis.

- When the futures price increases by more than the spot price, the basis declines - called weakening of the basis.
Basis Risk

Use the following notation

\[ S_1 \equiv \text{Spot price at time } t_1 \]
\[ S_2 \equiv \text{Spot price at time } t_2 \]
\[ F_1 \equiv \text{Futures price at time } t_1 \]
\[ F_2 \equiv \text{Futures price at time } t_2 \]
\[ b_1 \equiv \text{Basis at time } t_1 \]
\[ b_2 \equiv \text{Basis at time } t_2 \]

Suppose at the time of initiation the hedge and spot prices are $2.50 and $2.20, respectively. At the time of closing of the position, the hedge and spot are $2.00 and $1.90, respectively. Hence, \( S_1 = 2.50, \) \( F_1 = 2.20 \) and \( S_2 = 2.00, \) \( F_2 = 1.90. \)
Consider the following basis variation over time:

From our definition of basis we have

\[ b_1 = S_1 - F_1 \quad \text{and} \quad b_2 = S_2 - F_2 \]

or \( b_1 = 0.3 \) and \( b_2 = 0.1 \).
Example:

- Consider a hedger who knows that the asset will be sold at time $t_2$ and takes a short futures position at time $t_1$

- The price realized for the asset is $S_2$ and the profit on the futures position is $F_1 - F_2$. The effective price that is obtained for the asset with hedging is:

\[ S_2 + F_1 - F_2 = F_1 + b_2 (= \$2.30). \]

The value of $F_1$ is known at $t_1$, but we do not know $b_2$. If we did know $b_2$ then we would be able to construct a perfect hedge. This is an uncertainty in the hedge.

- We call $b_2$ the basis rate.
Homework

Due Sept. 19, 5PM.

• 2.1, 2.3, 2.14, 2.23, 2.24

• Graded: 2.26, 2.27, 2.28

Midterm Date, Wednesday, Nov. 7th

Office Hours, Mondays, 10:15AM-11:00AM, 6:30PM-6:45PM
Wednesdays, 10:15AM - 11:15AM