A futures contract must specify:

a) the underlying asset, its grade and size,
b) the delivery date,
c) the delivery location, and

d) the futures price.
Price movement limits

- For most contracts, *daily price movement limits* are specified by the exchange.
- If in a day the price moves down from the previous day’s close by an amount equal to the daily price limit, the contract is said to be *limit down*.
- If it moves up by the limit, it is said to be *limit up*.
- Normally, trading ceases for the day once the contract is limit up or limit down.
The purpose of daily price limits is to prevent large price movements from occurring because of speculative excesses.

However, limits can become an artificial barrier to trading when the price of the underlying commodity is advancing or declining rapidly.

*Position limits* are the maximum number of contracts that a speculator may hold. The purpose of these limits is to prevent speculators from exercising undue influence on the market.
As the delivery period for a futures contract is approached, the futures price converges to the spot price of the underlying asset.

Suppose that the futures price is above the spot price during the delivery period. Traders then have a clear arbitrage opportunity:

1. Sell (i.e., short) a futures contract
2. Buy the asset
3. Make the delivery
4. Profit = amount by which futures price > spot price
As traders exploit this arbitrage opportunity, the futures price will fall.

At maturity, the two prices will converge.
The operation of margins

- If two investors get in touch with each other directly and agree to trade an asset in the future, there are obvious risks.
- One of the investors may regret the deal and try to back out. Alternatively, the investor simply may not have the financial resources to honour the agreement.
- One of the key roles of the exchange is to organise trading so that contract defaults are avoided.
- This is where margins come in.
The operation of margins: Example

- An investor contacts his broker to buy two December gold futures contracts.
- The current futures price is $1,250 per ounce and the size of each gold contract is 100 ounces.
- The investor has contracted to buy a total of 200 ounces (i.e., 2 contracts) at this price.
- The broker will require the investor to deposit funds in a margin account. Initial margin is $6,000/contract.
- At the end of each trading day, the margin account is adjusted to reflect the investor’s gain or loss. This practice is referred to as daily settlement or marking to market.
### The operation of margins: Example

Maintenance margin = $4,500 per contract

<table>
<thead>
<tr>
<th>Day</th>
<th>Trade price ($)</th>
<th>Settlement price ($)</th>
<th>Daily gain ($)</th>
<th>Cumulative gain ($)</th>
<th>Margin account balance ($)</th>
<th>Margin call ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,250.00</td>
<td></td>
<td></td>
<td></td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>2</td>
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<td>−1,800</td>
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<td></td>
</tr>
<tr>
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<td>−1,980</td>
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<tr>
<td>6</td>
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<td>−780</td>
<td>−2,760</td>
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<tr>
<td>7</td>
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<td>1,229.90</td>
<td>−1,260</td>
<td>−4,020</td>
<td>7,980</td>
<td>4,020</td>
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<tr>
<td>8</td>
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<td>1,230.80</td>
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<td>−3,840</td>
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<tr>
<td>9</td>
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<td>1,225.40</td>
<td>−1,080</td>
<td>−4,920</td>
<td>11,160</td>
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<tr>
<td>10</td>
<td>1,228.10</td>
<td>1,228.10</td>
<td>540</td>
<td>−4,380</td>
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</tr>
<tr>
<td>11</td>
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<td>1,211.00</td>
<td>−3,420</td>
<td>−7,800</td>
<td>8,220</td>
<td>3,780</td>
</tr>
<tr>
<td>12</td>
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<td>1,211.00</td>
<td>0</td>
<td>−7,800</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>14</td>
<td>1,216.10</td>
<td>1,216.10</td>
<td>360</td>
<td>−6,780</td>
<td>13,020</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>1,223.00</td>
<td>1,223.00</td>
<td>1,380</td>
<td>−5,400</td>
<td>14,400</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1,226.90</td>
<td></td>
<td>780</td>
<td>−4,620</td>
<td>15,180</td>
<td></td>
</tr>
</tbody>
</table>
Suppose that by the end of the first day the futures price has dropped by $9 from $1,250 to $1,241. The investor has a loss of $1,800.

The balance in the margin account would therefore be reduced to $10,200.

Similarly, if the price of December gold rose to $1,259 by the end of the first day, the balance in the margin account would be increased to $13,800.

A trade is first settled at the close of the day on which it takes place. It is then settled at the close of trading on each subsequent day.
When there is a decrease in the futures price so that the margin account of an investor with a long position is reduced by $1,800, the investor’s broker has to pay the exchange $1,800 and the exchange passes the money on to the broker of an investor with a short position.

Similarly, when there is an increase in the futures price, brokers for parties with short positions pay money to the exchange and brokers for parties with long positions receive money from the exchange.
The investor is entitled to withdraw any balance in the margin account in excess of the initial margin.

To ensure that the balance in the margin account never becomes negative a maintenance margin, which is somewhat lower than the initial margin, is set. If the balance in the margin account falls below the maintenance margin, the investor receives a margin call and is expected to top up the margin account to the initial margin level by the end of the next day. The extra funds deposited are known as a variation margin.

If the investor does not provide the variation margin, the broker closes out the position.
The maintenance margin is $4,500 per contract, or $9,000 in total.

The contract is entered into on Day 1 at $1,250 and closed out on Day 16 at $1226.90.

On Day 7, the balance in the margin account falls $1,020 below the maintenance margin level. This drop triggers a margin call from the broker for an additional $4,020 to bring the account balance up to the initial margin level of $12,000.

It is assumed that the investor provides this margin by the close of trading on Day 8.
On Day 11, the balance in the margin account again falls below the maintenance margin level, and a margin call for $3,780 is sent out.

The investor provides this margin by the close of trading on Day 12.

On Day 16, the investor decides to close out the position by selling two contracts. The futures price on that day is $1,226.90, and the investor has a cumulative loss of $4,620.

Note that the investor has excess margin on Days 8, 13, 14, and 15. It is assumed that the excess is not withdrawn.
Suppose that you enter into a short futures contract to sell July silver for $17.20 per ounce.

The size of the contract is 5,000 ounces.

The initial margin is $4,000, and the maintenance margin is $3,000.

What change in the futures price will lead to a margin call?
A trader buys two July futures contracts on frozen orange juice. Each contract is for the delivery of 15,000 pounds. The current futures price is 160 cents per pound, the initial margin is $6,000 per contract, and the maintenance margin is $4,500 per contract.

What price change would lead to a margin call?

Under what circumstances could $2,000 be withdrawn from the margin account which is common for both contracts?
To satisfy the initial margin requirements, but not subsequent margin calls, an investor can usually deposit securities with the broker. Government bonds are usually accepted in lieu of cash at about 90% of their face value. Shares are also accepted in lieu of cash, but at about 50% of their market value. Most brokers pay investors interest on the balance in a margin account.
The operation of margins: Further details

- Minimum levels for initial and maintenance margins are set by the exchange.
- Individual brokers may require greater margins from their clients than those specified by the exchange. However, they cannot require lower margins than those specified by the exchange.
- Margin levels are determined by the variability of the price of the underlying asset. The higher this variability, the higher the margin levels.
- Margin requirements are the same on short futures positions as they are on long futures positions.
A clearing house acts as an intermediary in futures transactions. It keeps track of all the transactions that take place during a day, so that it can calculate the net position of each of its members.

Just like an investor is required to maintain a margin account with a broker, the broker is required to maintain a margin account with a clearing house member and the clearing house member is required to maintain a margin account with the clearing house. The latter is known as a clearing margin.
The margin accounts for clearing house members are adjusted for gains and losses at the end of each trading day in the same way as are the margin accounts of investors.

In the case of the clearing house member, there is an original margin, but no maintenance margin.

In determining clearing margins, the exchange clearing house calculates the number of contracts outstanding on either a gross or a net basis. When the gross basis is used, the number of contracts equals the sum of the long and short positions. When the net basis is used, these are offset against each other.
Suppose a clearing house member has two clients: one with a long position in 20 contracts, the other with a short position in 15 contracts.

Gross margining would calculate the clearing margin on the basis of 35 contracts.

Net margining would calculate the clearing margin on the basis of 5 contracts.

Most exchanges currently use net margining.
At the end of one day a clearing house member is long 100 contracts, and the settlement price is $50,000 per contract.
The original margin is $2,000 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 clearing house?
Credit risk has traditionally been a main feature of the OTC markets.

There is always a chance that the party on the other side of an OTC trade will default.

In an attempt to reduce credit risk, collateralisation has been adopted in OTC markets.

Collateralisation is similar to the practice of posting margin in futures markets.
Collateral: Property or other assets that a borrower offers a lender to secure a loan.

If the borrower stops making the promised loan payments, the lender can seize the collateral to recoup its losses.

Because collateral offers some security to the lender in case the borrower fails to pay back the loan, loans that are secured by collateral typically have lower interest rates than unsecured loans.
Collateralisation

- If you get a mortgage, your collateral would be your house. If you stop making your monthly house payments, the lender can take possession of the home through a process called *foreclosure* and sell it to get back the principal it lent you.

- In margin trading, the securities in your account act as collateral in case of a margin call. Similarly, if you were to stop making your payments on an auto loan, the lender would seize your vehicle. When you borrow money with a credit card, however, there is no collateral, so credit card debt carries a significantly higher interest rate than mortgage debt or auto loan debt.
Consider two companies, A and B, that have entered into an OTC derivatives transaction such as a forward.

A collateralisation agreement applying to the transaction might involve the transaction being valued each day.

If, from one day to the next, the value of the transaction to company A increases by a positive amount X (so that the value to company B decreases by X), company B is required to pay X to company A.
Similarly, if the value to company B increases by a positive amount X (so that the value to company A decreases by X), company A is required to pay X to company B.

The contract is not settled daily, as in the case of futures. The payments are a security deposit designed to ensure that obligations will be honoured.

Interest is paid on the full amount of the funds that have been deposited by one party with the other.
Imagine a bank and a company that have agreed for collateralization if the contract value is above $10m for the bank. We could have the following situation:

<table>
<thead>
<tr>
<th>Period</th>
<th>Contract value for the bank ($)</th>
<th>Collateral that the company should deposit ($)</th>
<th>Collateral that the bank should give back ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.5m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10.5m</td>
<td>0.5m</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10.9m</td>
<td>0.4m</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10.2m</td>
<td></td>
<td>0.7m</td>
</tr>
</tbody>
</table>

The threshold is equivalent to a line of credit that the bank is ready to grant to the company.

This technique works well but if the company is starting to have difficulties, it won’t probably be able to deposit collateral.
After the Crisis, the US and other governments in the US have passed legislation requiring clearing houses to be used for some OTC transactions.

An OTC transaction is negotiated between two parties, A and B, in the usual way. It is then presented to a clearing house.

Assuming the clearing house accepts the transaction, it becomes the counterparty to both A and B.

The clearing house takes on the credit risk of both A and B. It manages this risk by requiring an initial margin and daily variation margins from them.
Systemic risk

- Systemic risk is the risk that a default by one financial institution will create a “ripple effect” that leads to defaults by other financial institutions and threatens the stability of the financial system.
- There are huge numbers of OTC transactions between banks. If Bank A fails, Bank B may take a huge loss on the transactions it has with Bank A. This in turn could lead to Bank B failing. Bank C that has many outstanding transactions with both Bank A and Bank B might then take a large loss and experience severe financial difficulties……….
One of the motivations for the legislation requiring that clearing houses be used for OTC transactions is what might be termed the “AIG fiasco.”

During the period leading up to the credit crisis, AIG provided protection to other financial institutions against a huge volume of credit risks that were related to subprime mortgages.

Since AIG had a AAA credit rating at the time the transactions were negotiated, it was not required to post collateral by its counterparties.

The transactions resulted in big losses for AIG and led to an $85 billion bailout of the company by the US government.