

Risk Management and Derivatives | Lecture 2

Mechanics of Futures Markets and Central Counterparties

In Class Group Activity

· SJTU Summer School 2026 · Fatih Kansoy

How this block runs. You work in your home group of four or five, textbook open. Roles rotate today: **Scribe** (writes the answer), **Reporter** (speaks at the microphone), **Sceptic** (must raise one objection), **Timekeeper**. All money today is in US dollars (\$) and pounds sterling (£).

- **Phase 1, Concept checks (~10 min).** For each question you vote on your own first. Then you talk for about 90 seconds with the people next to you, and vote again. Do not talk before the first vote.
- **Phase 2, Desk problem (~20 min).** One problem in parts. Your Reporter presents one part when the microphone reaches your group. Then we solve it together, part by part.
- **Phase 3, Case (~25 min).** You read one real story. The ending is hidden on purpose. You answer four questions and take a position. Then we reveal what happened.

A short word list for this block: a **clearing house** (also called a central counterparty, or CCP) steps into the middle of every cleared trade. **Margin** is cash you place as security against losses. The **initial margin** is the deposit you post to open a position. The **maintenance margin** is a lower floor. A **margin call** asks you to add cash when your balance falls below that floor.

Phase 1 – Concept checks

~10 MIN

ConcepTest 1. You buy one gold futures contract on a US exchange. Your trade is matched and cleared. One week later, the firm that originally sold the contract to you goes bankrupt. Is your futures position safe? Choose the best answer.

- (a) No. Your contract was with that firm, so it is now worthless.
- (b) Yes. After clearing, the clearing house (the CCP) became your counterparty. It is now the seller to you, so the firm's bankruptcy does not touch your position.
- (c) It is safe only if the firm had posted enough margin to you directly.
- (d) It depends on whether you can find a new buyer to replace the bankrupt firm.

ConcepTest 2. You go long one crude oil futures contract. The contract is 1,000 barrels, and the price is \$80 per barrel. You post \$6,000 initial margin. Over the next few weeks, oil falls to \$70. A classmate says: "The most you can lose is your \$6,000 margin, like an option premium." Is the classmate right? Choose the best answer.

- (a) Yes. \$6,000 is the maximum loss.
- (b) No. Your loss is $(80 - 70) \times 1,000 = \$10,000$, which is already more than the \$6,000 margin. You would also get margin calls for more cash along the way.
- (c) No. You can lose at most twice the margin.
- (d) No, but only the broker, not you, is exposed beyond the margin.

ConceptTest 3. Through a clearing house, three banks' promises to each other add up to £270 million in total (this total is called the gross amount). After multilateral netting, only £20 million actually changes hands. A journalist writes: "So £250 million of debt just disappeared; netting cancels real debts." Is the journalist right? Choose the best answer.

- (a) Yes. Netting cancels £250 million of debt.
- (b) No. Every promise is still paid in full. Netting just combines them, so only the net difference moves as cash. The £270 million of exposures was real; netting reduced the payments that move, not the obligations.
- (c) Yes, because the clearing house forgives the difference.
- (d) No. The full £270 million still moves; the £20 million is only a fee.

Phase 2 – The desk problem

~20 MIN

You run the futures desk: a margin account through the storm

The setting. You run the futures desk. All money is in US dollars (\$). You go **long 2 crude oil futures contracts** on a US exchange. Each contract is 1,000 barrels, so **2,000 barrels** in total. You enter at \$80.00 per barrel.

Today's numbers:

- Initial margin: \$6,000 per contract.
- Maintenance margin: \$4,500 per contract.
- Each \$1 move in the price changes the account by \$2,000 (because you hold 2,000 barrels).

Part (a). The two margin totals. Margin is a good-faith deposit (collateral). It is not a part-payment for the oil and not a fee.

- (1) Work out the total initial margin for the two contracts.
- (2) Work out the total maintenance margin for the two contracts. This number is the floor.

Part (b). The six-day settlement path. Each day the exchange settles your account in cash (this is mark to market). Fill in this table day by day. Start the account at the total initial margin. A margin call comes only if the balance falls *below* the maintenance floor, and it tops the account back up to the *initial* level.

day	settle	move	P&L on 2,000 bbl	balance	action
1	\$79.50	−0.50	?	?	?
2	\$78.50	−1.00	?	?	?
3	\$77.50	−1.00	?	?	?
4	\$79.00	+1.50	?	?	?
5	\$80.50	+1.50	?	?	?
6	\$81.00	+0.50	?	?	?

Then answer: which day lands exactly on the floor with no call? Which day triggers a margin call, and how much cash must you add that day?

Part (c). Reconcile the cash. Check that the daily settlement matches one simple price move.

- (1) Add up all the cash you put in: the initial margin plus any margin call.
- (2) Read off your final balance on Day 6.
- (3) Work out your net gain (final balance minus total cash you put in).
- (4) Check it against the price: $(81.00 - 80.00) \times 2,000$. Do the two agree?

Part (d). Leverage, and the default waterfall.

- (1) **Leverage from margin.** Work out the notional you control ($2,000 \times 80$), then divide by the initial margin to get your leverage. Say in one sentence what this tells you.
- (2) **The default waterfall.** A *different* clearing member defaults. After closing its account, \$8 million of loss is left to cover. That member had posted \$5 million initial margin and \$1 million into the default fund. The resources are used in a fixed order:
 - i. the defaulter's own initial margin;
 - ii. then the defaulter's own default-fund slice;
 - iii. then the CCP's own capital ('skin in the game'), which is \$0.5 million here;
 - iv. then the surviving members' shared (mutualised) default fund.

Work out how much the surviving members, who did nothing wrong, together lose. This sharing of loss is called mutualisation.

Part (e). Interpret the lesson. The lesson of the day is: "margin converts credit risk into liquidity risk." Use Day 3 to explain what this means. Before clearing, what was your worry? After clearing, what new worry did Day 3 give you? What happens if you cannot find the cash?

Extension (for fast groups): multilateral netting. Three banks owe each other through the CCP.

- Bank A owes Bank B £80m.
- Bank B owes Bank C £100m.
- Bank C owes Bank A £90m.

- (1) Work out the gross total of all the promises.
- (2) Work out each bank's net position (what it receives minus what it pays).
- (3) How much cash actually moves, and who pays it to whom?

Phase 3 – The case

~25 MIN

GameStop and the clearing house (United States, January 2021)

How to run this. Read the story with your group. The ending is hidden on purpose. Answer the four questions and take a clear position. Do not search the internet. Use only what you know from the lecture. I will reveal what happened next. All money is in US dollars (\$).

The story. It is late January 2021. You work in the risk team at a large US online stock broker. Your firm lets millions of small customers buy and sell shares for free on a phone app. One of those shares is GameStop, a struggling video-game shop. For reasons that started on social media, huge crowds of small investors are buying GameStop at the same time. The price moves from a few dollars to hundreds of dollars in days. The trading is very fast and the price swings are enormous.

To understand your problem, you need to see the chain behind every trade.

1. A **customer** taps 'buy' on your app.
2. Your firm is the **broker**. You send the trade to the market.
3. Your firm is also a member of the **clearing house**. In US shares this clearing house is the NSCC (the National Securities Clearing Corporation). The NSCC sits in the middle of trades and guarantees that each one will settle.
4. Behind the NSCC stand the **regulators**.

Here is the key timing rule. In the United States in 2021, a share trade does not finish on the same day. It settles two business days later. This is called **T+2**: trade today, money and shares change hands two days after. During those two days, the clearing house carries a risk. If your firm took its customers' orders but then could not pay on settlement day, the clearing house would have to cover the gap. So during the T+2 window the NSCC asks each broker to post **collateral**, also called margin. This is not a fee and not a payment for the shares. It is a deposit that protects the clearing house if the broker fails to pay.

The size of the deposit is not fixed. A computer model sets it. When a stock is calm, the deposit is small. When a stock's price moves very fast and by large amounts, and the trading volume is huge, the model demands much more, because the possible two-day loss is much bigger. GameStop in late January was about as volatile as a stock can be, and your customers were buying enormous amounts of it.

It is the very early morning of **28 January 2021**, hours before the US market opens. An automated message arrives from the clearing house. The model has recalculated your firm's deposit. The total amount the clearing house now wants from you is **about \$3 billion**.

You already hold a few hundred million dollars of spare cash that you could move quickly. The new demand is many times larger than that. The market opens in a few hours. If you cannot post the collateral, the clearing house can act against your firm. Your phone is ringing.

You must decide what to do.

The story stops here.

Four discussion questions (answer as a group; take a position):

1. **What the deposit covers.** What risk is the clearing house covering with this deposit, and why do fast price moves and the two-day (T+2) gap make the number so large? Remember the deposit is collateral, not a fee.
2. **The chain.** Follow the chain: customer to broker to clearing house. The clearing house sent the demand to the broker. Who, in the end, has to find the cash? Who carries the pressure?
3. **Failing or working?** Is this the system **failing** or the system **working**? Give one reason for each side before your group decides.
4. **The lesson.** Explain the sentence 'margin converts credit risk into liquidity risk' using this story. Then answer: if the clearing house simply demanded more margin from everyone, would that make the system 'safe', or would it only move the problem somewhere else?

End of activity handout. Solutions are distributed after the block.