

Risk Management and Derivatives | Lecture 2

Mechanics of Futures Markets and Central Counterparties

Group activity solutions

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Phase 1 – Concept checks

- **CT1: (b).** When your trade cleared, the clearing house stepped into the middle. This step is called novation. Your one trade became two contracts, and the CCP is now the seller to you. So the original firm is no longer your counterparty. Its bankruptcy does not touch you.
- **CT2: (b).** A futures loss tracks the full price move on the whole position. Here oil fell \$10, so on 1,000 barrels the loss is $(80 - 70) \times 1,000 = \$10,000$, already more than the \$6,000 margin. Before you reached that point, margin calls would have asked you for more cash. An option buyer's loss is capped at the premium; a futures holder's loss is not.
- **CT3: (b).** Every promise is still paid in full. Netting only combines the promises so that one small net amount, £20 million, moves as cash. The £270 million of exposure was real, and it was settled. Netting cut the cash that moves, not the obligations. No debt was cancelled.

Phase 2 – Desk problem, fully worked

(a) The two margin totals

Margin is a deposit, not a fee and not a part-payment for the oil. You post the initial margin to open the position. The maintenance margin is a lower floor; if the balance drops below it, you get a call.

Answer. Initial margin total = $2 \times 6,000 = \$12,000$. Maintenance margin total = $2 \times 4,500 = \$9,000$. The floor is \$9,000.

(b) The six-day settlement path

Each day the exchange settles the day's gain or loss in cash. Each \$1 move changes the account by \$2,000. A call comes only when the balance is *below* the \$9,000 floor, and it tops you back up to the \$12,000 initial level.

Calculation. Start the account at \$12,000.

day	settle	move	P&L	balance	action
1	79.50	-0.50	-1,000	11,000	no call
2	78.50	-1.00	-2,000	9,000	at the floor, no call
3	77.50	-1.00	-2,000	7,000	below floor: margin call
				12,000	add \$5,000, back to initial
4	79.00	+1.50	+3,000	15,000	no call
5	80.50	+1.50	+3,000	18,000	no call
6	81.00	+0.50	+1,000	19,000	no call

Day 2 lands *exactly* on the \$9,000 floor, so there is no call (a call needs a balance below the floor).

Day 3 falls to \$7,000, which is below the floor, so you get a margin call. The call tops you back up to the initial \$12,000, so you must add $12,000 - 7,000 = \$5,000$.

(c) Reconcile the cash

The daily settlement is just one simple price gain, paid out day by day. So the cash story must match the single price move from \$80 to \$81.

Calculation.

- (1) Cash you put in = initial \$12,000 + the call \$5,000 = \$17,000.
- (2) Final balance on Day 6 = \$19,000.
- (3) Net gain = 19,000 – 17,000 = \$2,000.
- (4) Check from the price: $(81.00 - 80.00) \times 2,000 = \$2,000$. The two agree.

(d) Leverage, and the default waterfall

A small deposit controls a large position. That is leverage, and it cuts both ways. The waterfall is the fixed order of who pays when a member defaults: the defaulter pays first, the honest members pay last.

Calculation.

- (1) **Leverage.** Notional = $2,000 \times 80 = \$160,000$. Leverage = $160,000 \div 12,000 =$ about **13.3 times**. A small deposit of \$12,000 controls \$160,000 of oil, so a small price move is a large move on your deposit.
- (2) **The default waterfall.** The loss to cover is \$8 million.

layer used	amount	still to cover
Loss to cover		8.0
1. Defaulter's own initial margin	−5.0	3.0
2. Defaulter's own default-fund slice	−1.0	2.0
3. CCP's own capital ('skin in the game')	−0.5	1.5
4. Surviving members' shared default fund	−1.5	0

The surviving members, who did nothing wrong, together lose **\$1.5 million**. This sharing of loss is called mutualisation. (Check: $5 + 1 + 0.5 + 1.5 = 8$.)

(e) Interpret the lesson

Read from Day 3. Before clearing, your worry was **credit risk**: will my counterparty pay me? Clearing removed that worry, because the CCP stands behind the trade. But on Day 3 you got a new worry: find \$5,000 in cash, today. That is **liquidity risk**. If you cannot pay, the broker force-closes your position, maybe at a bad moment. The risk did not vanish. It changed shape.

Extension: multilateral netting

If each bank paid every promise on its own, a lot of cash would move. Netting lets the clearing house add up what each bank owes and is owed, and move only the leftover difference.

Calculation.

- (1) Gross total = $80 + 100 + 90 = \text{£}270\text{m}$.
- (2) Each bank's net position:
 - Bank A: receives 90, pays 80 → net **receive £10m**.
 - Bank B: receives 80, pays 100 → net **pay £20m**.
 - Bank C: receives 100, pays 90 → net **receive £10m**.

- (3) Cash that moves: Bank B pays £20m (£10m to A and £10m to C). Gross £270m collapses to net £20m. The same obligations are settled with far less cash moving.

Phase 3 – Case: what happened

Early on 28 January 2021, the NSCC's automated system told Robinhood it had a deposit shortfall of about \$3 billion before the US market opened. The number had two parts: a core deposit based on the value-at-risk model that rose to about \$1.3 billion, plus an extra 'excess capital premium' charge of about \$2.2 billion. Robinhood already held about \$696 million on deposit, so the new shortfall was about \$3 billion.

Over the next hours, after several phone calls with the clearing house, the NSCC waived the discretionary excess-capital-premium add-on. The required deposit fell to **about \$1.4 billion**. To meet even that reduced figure and to cut its future collateral need, Robinhood **restricted the buying** of GameStop and a set of other volatile stocks (customers could still sell, but new buying was limited). It also **drew on bank credit lines** and, within days, **raised several billion dollars** of new emergency funding.

Robinhood survived the morning. No clearing member defaulted, and the clearing house did not have to use any shared default fund. The buying restrictions made many customers very angry. A congressional hearing followed in February 2021.

Why this is the lesson of the day. Clearing did its job: no customer had to worry that the firm on the other side of their GameStop trade would not pay. The clearing house guaranteed settlement and stood in the middle. But that guarantee was not free. It was paid for in **collateral**, and the bill arrived as a sudden cash demand that nearly broke the broker. The credit risk of settlement asked one question: will the trade settle? Clearing turned that into a **liquidity risk** for Robinhood: can it find about \$3 billion in cash before the market opens? The risk did not vanish. It changed shape and concentrated on the firm that had to post the margin. More margin makes the clearing house safer, but it does not delete the risk; it pushes the need for cash onto the members. Markets are not protected by trust. They are protected by collateral (margin).

End of solutions.