CHARTA LEARNING · LESSON NOTES

Exchanges and OTC Markets

FRM Part I

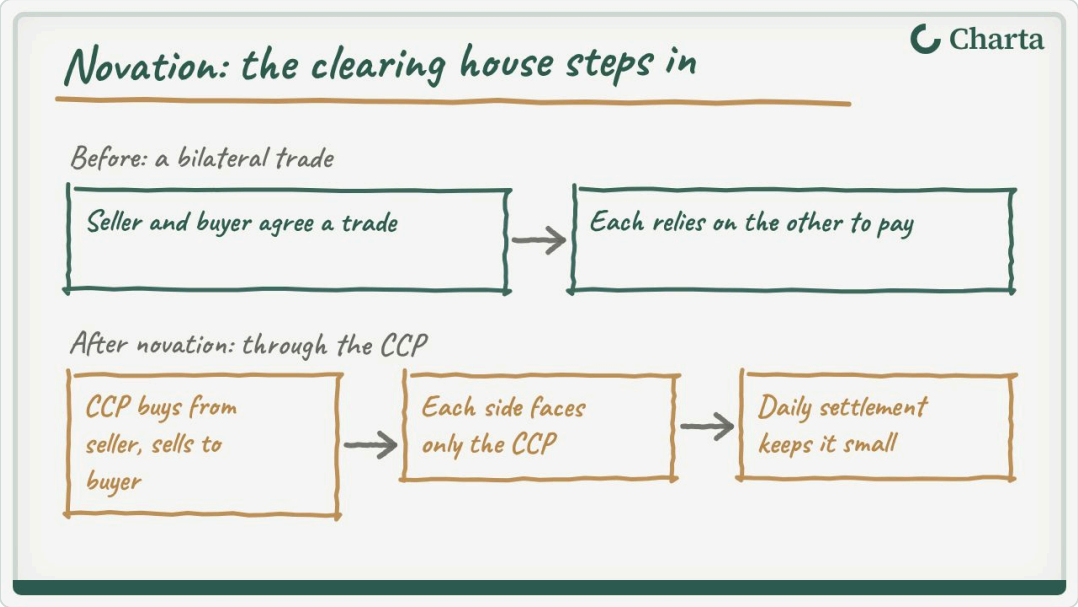
1 A story: what if the other side walks away?

- Counterparty risk: the other side may not perform
- A buyer or seller can walk away when prices move
- Fix: a trusted middleman between buyer and seller
- On an exchange this is the clearing house, or CCP

IN THE LESSON

- Imagine you agree to buy a used car from a stranger, with payment in a month.
- A month later the price of such cars has jumped, and the seller would rather not sell to you.
- Or the price has fallen, and you would rather not buy.
- Each side can simply walk away.
- That danger is called counterparty risk: the chance that the other party to a deal fails to do what it promised.
- Now imagine a trusted middleman who stands between every buyer and every seller, checks that both can afford their promises, and collects a deposit from each.
- That is what an exchange does through its clearing house, and it is the first idea in this lesson.

2 Novation: the clearing house steps in



IN THE LESSON

- Here is the trick, called novation.
- Look at the top row.
- A seller and a buyer agree a trade, and for the moment each depends on the other.
- Now the bottom row.
- Once the trade is matched, the clearing house, also called the central counterparty or C C P, steps in.
- The original contract is replaced by two new ones.
- The C C P becomes the buyer to every seller and the seller to every buyer.
- The seller no longer cares who the original buyer was, and the buyer no longer cares about the seller.
- Each trader's exposure is to the C C P alone.
- The last box says what keeps that safe: gains and losses are settled every day, so an exposure never grows large.

3 CCP defences: risk is shared, not abolished

- Admit only well-capitalized clearing members
- Initial margin when a position is opened
- Variation margin: gains and losses settled daily
- Position limits: no member builds a huge exposure
- Default fund: a pool paid in by the members

IN THE LESSON

- How does the central counterparty protect itself?
- Five defences, all on the board.
- First, it admits only well capitalized clearing members, so weak firms cannot join.
- Second, it collects initial margin, a deposit taken when a position opens, sized to cover a plausible bad move.
- Third, it settles gains and losses every day through variation margin, so no loss can pile up.
- Fourth, it sets position limits, so no member can build an enormous exposure.
- Fifth, it holds a default fund, a pool of money contributed by the members themselves.
- Notice what has happened to the risk.
- It has not vanished.
- It is concentrated in the central counterparty and shared among its members.
- The key point is that daily settlement keeps exposure to roughly one day of price movement.

4 Who pays when a member defaults

Losses are absorbed in this order, defaulter first

Order	Who absorbs the loss
1	Defaulter's own margin
2	Defaulter's default fund share
3	The CCP's own capital
4	Survivors' contributions

IN THE LESSON

- Suppose a member does default.
- Who pays?
- The losses are absorbed in a strict order, shown on the board.
- First comes the defaulter's own margin, the deposit it put up.
- Second, its share of the default fund.
- Third, the central counterparty's own capital, which means the clearing house itself has money at stake and so has a reason to manage risk well.
- Only fourth, if losses are still not covered, do the contributions of the surviving members come in.
- This ordering matters.
- The defaulter pays first, and the healthy members are touched last.
- Next we put illustrative numbers on this order.

5 Example 1: the default waterfall

Loss 100; margin 60; fund share 15; CCP capital 10; survivors 15

Defaulter's own margin	100 − 60	**40 left**
Defaulter's fund share	40 − 15	**25 left**
CCP's own capital	25 − 10	**15 left**
Survivors' contributions	15 − 15	**0 left**

IN THE LESSON

- Example one, an illustration with round numbers, in millions of dollars.
- A member defaults, leaving a loss of one hundred.
- Its own margin is sixty.
- One hundred minus sixty leaves forty still uncovered.
- Its share of the default fund is fifteen.
- Forty minus fifteen leaves twenty five.
- The central counterparty puts in its own capital of ten.
- Twenty five minus ten leaves fifteen.
- The last fifteen falls on the surviving members, who contribute fifteen between them.
- Fifteen minus fifteen leaves nothing.
- So the defaulter covered seventy five of the hundred, the clearing house ten, and the survivors fifteen.
- Had the loss been sixty or less, the defaulter's margin alone would have covered it.

6 Clearing developments since the crisis

- G20 (2009): standard swaps cleared through CCPs
- Trade repositories let supervisors see exposures
- Non-cleared: variation and initial margin, more capital
- Compression tears up offsetting trades among dealers
- CLS Bank: both currency legs settle together

IN THE LESSON

- Since the financial crisis of two thousand seven to two thousand nine, several developments have lowered risk.
- In two thousand nine the leaders of the G twenty agreed that standardized over the counter derivatives, such as interest rate swaps and index credit default swaps, should be cleared through central counterparties, and that trades should be reported to trade repositories so supervisors can see exposures.
- Trades that are not cleared face mandatory variation margin, initial margin for large dealers, and higher capital charges.
- Compression tears up offsetting trades.
- And in foreign exchange, C L S Bank settles both currency legs together.
- Compression and repositories reduce complexity and opacity, while central counterparties and margin reduce credit exposure.

7 Example 2: portfolio compression

A pays B 100, B pays C 100, C pays A 70 (identical swaps)

Gross notional before	100 + 100 + 70	**270**
Net position of A	−100 + 70	**−30**
Net position of B	+100 − 100	**0**
Gross after compression	A pays C 30	**30**

IN THE LESSON

- Example two, compression.
- Three dealers hold identical swaps, in millions of notional.
- A pays B one hundred, B pays C one hundred, and C pays A seventy.
- The gross notional is one hundred plus one hundred plus seventy, which is two hundred and seventy.
- Now look at each dealer's net position.
- A pays one hundred and receives seventy, a net of minus thirty.
- B receives one hundred and pays one hundred, a net of zero.
- So B has no net exposure at all.
- The dealers tear up all three trades and replace them with one, in which A pays C thirty.
- Gross notional falls from two hundred and seventy to thirty, every net position is unchanged, and the operational load is far lower.

8 Example 3: settlement risk and CLS

Bank A pays its currency leg first; Bank B fails before paying

A sends its leg, worth	100 out	**−100**
B fails; its leg unpaid	0 comes back	**0**
Loss without PvP	100 − 0	**100**
Loss with PvP at CLS	both legs or neither	**0**

IN THE LESSON

- Foreign exchange adds its own danger.
- A currency trade has two legs, and because of time zones one leg is often paid hours before the other.
- In nineteen seventy four a German bank, Herstatt, was closed by its regulator after it had received payments in one currency but before it paid out the other.
- Its counterparties lost what they had sent.
- The danger is called Herstatt risk, or settlement risk.
- Example three, an illustration.
- Bank A sends its leg, worth one hundred.
- Bank B fails before sending the other leg, so nothing comes back.
- Without payment versus payment, the loss is one hundred minus zero, a full one hundred.
- With C L S Bank, both legs settle together or not at all, so the loss is zero.

9 Netting: many obligations become one

- Netting replaces many obligations with one
- Payment netting: offset same-day payments
- Close-out netting: on default, one net sum
- Needs a master agreement, such as the ISDA Master
- With a CCP: one net position per member, multilateral

IN THE LESSON

- Netting means replacing many obligations between two parties with one.
- There are two kinds.
- Payment netting offsets payments due on the same day in the same currency.
- If you owe me ten and I owe you seven, only three actually moves.
- Close out netting is the kind that matters for credit risk.
- Under a master agreement, such as the I S D A Master Agreement, if one party defaults, every transaction under the agreement is terminated, valued, and combined into a single net amount owed by one side.
- With a central counterparty, novation makes netting multilateral: each member ends up with one net position against the clearing house, across all of its trading partners in the cleared trades.
- The benefit only counts where netting is legally enforceable.

10 Example 4: payment netting

Same day, same currency (illustration, in dollars)

A owes B		**10**
B owes A		**7**
Net payment, A to B	10 − 7	**3**
Cash movement avoided	17 − 3	**14**

IN THE LESSON

- Example four, payment netting.
- A owes B ten, and B owes A seven, on the same day in the same currency.
- Instead of two payments, we net them.
- Ten minus seven leaves three, and only that three moves, from A to B.
- Without netting, seventeen of cash would change hands.
- With netting, three does.
- So the cash that has to move falls by seventeen minus three, which is fourteen.
- Netting also means a smaller amount is at risk during settlement: three, instead of ten.
- But it covers only payments on the same day in the same currency.
- The larger saving for credit risk comes from close out netting.

11 Credit exposure with and without netting

With netting: Exposure = max(Σ values, 0)
Without: Exposure = Σ max(value, 0)

Net sum	Sum of values in one netting set
Floor at zero	Floored at zero if negative
Positives only	No netting: positive trades only

IN THE LESSON

- Now the formula for credit exposure.
- Suppose two parties have several trades, each with a value to you, positive if the counterparty owes you, negative if you owe the counterparty.
- With close out netting, the exposure is the sum of all the trade values, floored at zero.
- If the net sum is negative, you owe money, and there is no claim for you to lose.
- Without netting, the exposure is the sum of only the positive trade values, because a failing counterparty may cherry pick, demanding payment on the trades that favour it while not honouring the others.
- So netting never raises exposure and usually lowers it.
- Remember the limits.
- Netting cuts exposure only where it is legally enforceable, and only within one netting set, meaning the trades covered by one agreement.

12 Example 5: close-out netting

Trade values to you: +8, +5, −9 (illustration)

Net value of the set	8 + 5 − 9	**4**
Exposure with netting	max(4, 0)	**4**
Exposure without netting	8 + 5	**13**
Trade of −6 outside the set	not offset: 4 + 0	**4**
Same trade inside the set	max(4 − 6, 0)	**0**

IN THE LESSON

- Example five, close out netting.
- You hold three trades with one counterparty, all under one master agreement, worth plus eight, plus five and minus nine to you.
- The net value is eight plus five minus nine, which is four.
- The exposure with netting is the larger of four and zero, so four.
- Without netting it would be the positive trades only, eight plus five, thirteen.
- So netting cuts the exposure from thirteen to four.
- Now add a fourth trade, worth minus six to you, but suppose it sits outside the agreement.
- It cannot be offset, so exposure stays four plus zero, which is four.
- Had it been inside the set, the net would be four minus six, below zero, and the exposure would be zero.

13 Margining in practice

- Initial margin: deposit when the position is opened
- Variation margin: daily mark to market, gain or loss
- Maintenance margin: lower; no call while above it
- Below maintenance: deposit back up to INITIAL margin
- Gain = price change × size × contracts; short reverses

IN THE LESSON

- Now margin in practice.
- Exchange margining has three parts.
- Initial margin is the deposit the clearing house requires when a position is opened, sized to cover a plausible adverse move.
- Variation margin is the daily settlement: the account is marked to market at the settlement price, and the day's gain or loss is added or removed.
- Maintenance margin is a lower level.
- The balance may drift below the initial level without any call.
- But once it falls below maintenance, a margin call requires a deposit that restores the balance to the initial margin, not merely to the maintenance level.
- For futures, the daily gain is the price change times the contract size times the number of contracts, and the sign depends on whether you are long or short.

14 Example 6: gains and margin levels

5 contracts of 100 units; initial 2,000 and maintenance 1,500 each

Long, price 50 to 48	−2 × 100 × 5	**−1,000**
Short, same move	+2 × 100 × 5	**+1,000**
Initial margin	2,000 × 5	**10,000**
Maintenance margin	1,500 × 5	**7,500**

IN THE LESSON

- Example six, futures margin.
- An illustration: five contracts, each covering one hundred units, with initial margin of two thousand per contract and maintenance margin of fifteen hundred.
- First the gain.
- If you are long and the futures price falls from fifty to forty eight, you lose two times one hundred times five, which is one thousand.
- A short position with the same move gains the same one thousand, so the sign depends on the side.
- The account must hold initial margin of two thousand times five, ten thousand, when it is opened.
- The maintenance level is fifteen hundred times five, seven thousand five hundred.
- As long as the balance stays above seven thousand five hundred, no call arrives.

15 The account day by day

5 contracts of 100; maintenance 7,500; call → 10,000

Day: settlement price	Change → balance
Open at 50	10,000
Day 1: 48	−1,000 → 9,000
Day 2: 44	−2,000 → 7,000
Call: back to initial	+3,000 → 10,000
Day 3: 46	+1,000 → 11,000

IN THE LESSON

- Let's follow the account day by day.
- We open at fifty with ten thousand in the account.
- On day one the price settles at forty eight, a fall of two, so the account loses one thousand and holds nine thousand.
- That is above the maintenance level, so no call.
- On day two the price settles at forty four, a fall of four, so the loss is two thousand and the balance is seven thousand.
- That is below seven thousand five hundred, so a margin call arrives.
- The deposit must restore the balance to the initial ten thousand, so the call is three thousand.
- On day three the price rises to forty six, a gain of two, worth one thousand, and the balance is eleven thousand.
- The extra thousand above initial margin can be withdrawn.

16 Buying stock on margin

- Broker lends part of the price; shares are collateral
- Initial margin (US: commonly 50%): investor funds it
- Equity = value − loan; margin ratio = equity ÷ value
- Ratio below maintenance (often 25-30%): margin call
- Interest on the loan is a cost; leverage cuts both ways

IN THE LESSON

- Now a different setting: buying stock on margin when no central counterparty is involved.
- The broker lends part of the price and holds the shares as collateral.
- Under the initial margin requirement, commonly fifty per cent in the United States, the investor funds that share of the purchase from their own money and borrows the rest at interest.
- Equity is the market value of the shares minus the loan, and the margin ratio is equity divided by market value.
- When the ratio falls below the maintenance margin, often twenty five to thirty per cent, a margin call follows.
- Leverage magnifies returns in both directions, and the interest on the loan is a cost that must always be included.

17 The margin call price

Long: $P_{call} = P_0 \times (1 - \text{initial}) \div (1 - \text{maint.})$
Short: $P_{call} = P_0 \times (1 + \text{initial}) \div (1 + \text{maint.})$

Starting price	Price when the trade started
Initial margin	Initial margin, as a fraction
Maintenance margin	Maintenance margin, as a fraction
Call price	Price that triggers the call

IN THE LESSON

- Here are the two call price formulas.
- For a long purchase at price P zero, the price that triggers a call is P zero times one minus the initial margin, divided by one minus the maintenance margin.
- Because a long position loses when the price falls, the call price is below the purchase price.
- For a short sale, the account holds the sale proceeds plus the investor's deposit, so the call comes on a rise in price.
- The formula is P zero times one plus the initial margin, divided by one plus the maintenance margin.
- The call price is above the starting price.
- Long positions are hurt by falls, short positions by rises.

18 Example 7: a long purchase on margin

1,000 shares at $40; initial margin 50%; maintenance 25%

Purchase	1,000 × $40	**$40,000**
Loan at 50% margin	40,000 × 50%	**$20,000**
Call price	40 × 0.50 ÷ 0.75	**$26.67**
Check: equity ÷ value	(26,667 − 20,000) ÷ 26,667	**25%**

IN THE LESSON

- Example seven, a long purchase on margin.
- An illustration: you buy one thousand shares at forty dollars, so the purchase is forty thousand dollars.
- With a fifty per cent initial margin, the loan is forty thousand times fifty per cent, twenty thousand dollars, and you put up the other twenty thousand.
- Maintenance margin is twenty five per cent.
- The call price is forty times one minus point five, divided by one minus point two five: forty times point five over point seven five, which is twenty six dollars and sixty seven cents.
- Check it: the shares are then worth about twenty six thousand six hundred and sixty seven, equity is that minus the loan, and the ratio is twenty five per cent.
- A fall of about a third triggers the call.

19 Margin ratio as the price falls



IN THE LESSON

- Here is the same position as a picture.
- Along the bottom is the share price and up the side is the margin ratio, equity divided by market value.
- At the purchase price of forty dollars the ratio is fifty per cent.
- As the price falls, the loan stays at twenty thousand while the value shrinks, so equity is eaten away faster, and the ratio falls along this curve.
- The level guide shows the maintenance margin of twenty five per cent.
- The curve crosses it at twenty six dollars and sixty seven cents, the call price.
- Below that a call is issued.
- At twenty dollars, the equity is gone.

20 Example 8: leverage and interest

Same position; price falls 20% to $32; loan interest 5% a year

Shares now worth	1,000 × $32	**$32,000**
Equity	32,000 − 20,000	**$12,000**
Return on equity	(12,000 − 20,000) ÷ 20,000	**−40%**
With a year of interest	(−8,000 − 1,000) ÷ 20,000	**−45%**

IN THE LESSON

- Example eight, leverage.
- Suppose the price falls twenty per cent, from forty to thirty two dollars.
- The shares are worth one thousand times thirty two, thirty two thousand.
- Equity is thirty two thousand minus the twenty thousand loan, twelve thousand, still above the maintenance level, so no call.
- But look at the return on your own money.
- You put in twenty thousand and have twelve thousand, a loss of eight thousand, which is minus forty per cent: twice the fall in the price.
- Now add the interest.
- At five per cent on a twenty thousand loan, one year costs one thousand.
- The loss becomes nine thousand on twenty thousand, which is minus forty five per cent.

21 Example 9: a short sale on margin

Short 1,000 shares at $40; initial margin 50%; maintenance 25%

Sale proceeds held	1,000 × $40	**$40,000**
Deposit at 50%	40,000 × 50%	**$20,000**
Call price	40 × 1.50 ÷ 1.25	**$48**
Check at $48	(60,000 − 48,000) ÷ 48,000	**25%**

IN THE LESSON

- Example nine, a short sale.
- You borrow and sell one thousand shares at forty dollars.
- The account holds the sale proceeds, one thousand times forty, forty thousand dollars, plus your deposit at fifty per cent, forty thousand times fifty per cent, twenty thousand dollars.
- The call price is forty times one point five, divided by one point two five: sixty divided by one point two five is forty eight dollars.
- Check: at forty eight, you owe shares worth forty eight thousand, the account holds sixty thousand, equity is twelve thousand, and twelve over forty eight is twenty five per cent.
- So the long position was called on a fall of about a third, but the short position is called on a rise of twenty per cent.

22 Exchange-traded against OTC markets

Two ways to trade the same risks

Feature	Exchange | OTC
Contract terms	Standard | Negotiated
Trading and prices	One venue | Bilateral
Credit risk	Low, via CCP | Counterparty
Liquidity	High | Thinner if tailored
Best for	Speculation | Exact hedges

IN THE LESSON

- Now compare the two kinds of market.
- Exchange traded markets list standardized contracts, with fixed sizes, maturities and strikes.
- They trade in one venue with published prices, and every trade goes through a clearing house that collects margin.
- The result is liquidity, price transparency and little credit risk.
- That suits speculators, arbitrageurs, and hedgers whose exposure fits the contract terms.
- Over the counter markets are bilateral.
- Two parties negotiate any amount, date and structure, so forwards, swaps and bespoke options can hedge an exposure exactly.
- The cost is counterparty credit risk, less transparency, and thinner liquidity in tailored deals.
- Since the reforms, standardized swaps are often centrally cleared, which blurs the line, although terms are still negotiated bilaterally.
- The choice is customization against credit and liquidity features.

23 Example 10: a hedge that does not fit

Illustration: hedge an exposure with standard contracts

Exposure to hedge		**12,300 units**
Standard contract size		**1,000 units**
Whole contracts that fit	12,300 ÷ 1,000 = 12.3	**12**
Left unhedged (rounding)	12,300 − 12,000	**300 units**
OTC forward, exact amount		**12,300 units**

IN THE LESSON

- Example ten, a hedging choice.
- A business must hedge an exposure of twelve thousand three hundred units.
- The exchange contract covers one thousand units.
- Twelve thousand three hundred divided by one thousand is twelve point three, and you cannot trade a fraction, so you trade twelve contracts.
- Twelve thousand three hundred minus twelve thousand leaves three hundred units unhedged.
- That is rounding risk.
- A mismatch of date or asset adds basis risk, and a futures hedger also faces cash drains from daily settlement.
- A forward in the over the counter market could be written for exactly twelve thousand three hundred units, on the exact date.
- The price of that precision is credit exposure to the dealer.

24 OTC risks and their mitigants

Match each mitigant to the risk it addresses

Risk	Main mitigants
Counterparty credit risk	Netting, collateral, CVA
Wrong-way risk	Limits, triggers, diversify
Settlement risk	Payment versus payment
Liquidity and opacity	Clearing, repositories
Operational and legal risk	Master agreement; legal checks

IN THE LESSON

- Over the counter markets carry several linked risks.
- Counterparty credit risk is the main one: a contract with positive value to you is a claim on someone who may default.
- Wrong way risk arises when your exposure rises just as the counterparty's credit worsens.
- Settlement risk appears when one leg is paid before the other is received, as in foreign exchange.
- Liquidity risk comes from tailored contracts that are hard to unwind, and opacity can hide concentrations and spread contagion.
- Operational and legal risk comes from documentation and from whether netting will be enforced.
- Each has its own tool.
- Credit risk is met with close out netting, collateral, and credit valuation adjustment priced into the trade.
- Wrong way risk with limits, rating triggers and diversification.
- Settlement risk with payment versus payment.
- Liquidity and opacity with clearing and repositories.
- Legal risk with a sound master agreement.

25 Example 11: expected loss, wrong-way risk

Exposure 20, default probability 2%, loss given default 60% (millions)

Expected loss	20 × 2% × 60%	**0.24**
Stressed exposure	20 → 40	**40**
Stressed default probability	2% → 8%	**8%**
Wrong-way expected loss	40 × 8% × 60%	**1.92**
Increase	1.92 ÷ 0.24	**8 times**

IN THE LESSON

- Example eleven, expected loss.
- An illustration, in millions.
- The exposure to a counterparty is twenty, its probability of default is two per cent, and the loss given default, the share lost if it fails, is sixty per cent.
- Expected loss is exposure times probability of default times loss given default: twenty times two per cent times sixty per cent, which is point two four.
- Now wrong way risk.
- Suppose the counterparty's credit worsens, and at the same time exposure doubles to forty, while the probability of default rises to eight per cent.
- Expected loss is forty times eight per cent times sixty per cent, one point nine two.
- That is eight times larger, because the two effects multiply: one point nine two divided by point two four is eight.

26 OTC collateral: the call

Call = max(exposure − threshold, 0) − collateral held

Exposure	Mark-to-market exposure
Threshold	Unsecured amount one side accepts
Minimum transfer	Call moves only if above this
Collateral held	Collateral already posted
Margin period of risk	Days from last call to close-out

IN THE LESSON

- Collateralization in the over the counter market is the bilateral cousin of exchange margining.
- Under a credit support annex to the master agreement, the party whose net position is negative posts collateral, usually every day, to cover the other side's mark to market exposure.
- The terms are negotiated.
- The call is the larger of exposure minus the threshold and zero, minus the collateral already held.
- The threshold is the unsecured amount one side is willing to carry.
- A transfer happens only if the call exceeds the minimum transfer amount, to avoid trivial movements.
- The margin period of risk is the number of days between the last call and the close out of the position, during which the exposure can still grow.

27 Example 12: collateral calls by day

Threshold 2; minimum transfer 0.5; held 6 at the start (millions)

Day 1: exposure 12	max(12 − 2, 0) − 6	**Call 4**
Day 2: exposure 12.3	max(10.3, 0) − 10	**0.3: no move**
Day 3: exposure 9	max(7, 0) − 10	**−3: return**
Residual risk on day 2	12.3 − 10	**2.3**

IN THE LESSON

- Example twelve, a collateral call.
- An illustration, in millions.
- The threshold is two, the minimum transfer amount is point five, and collateral held is six.
- On day one the exposure is twelve.
- The call is the larger of twelve minus two and zero, which is ten, minus six held, so a call of four.
- After it, ten is held.
- On day two the exposure rises to twelve point three.
- Ten point three minus ten held is point three, below the minimum transfer amount, so nothing moves.
- On day three the exposure falls to nine.
- Seven minus ten held is minus three, so three is returned.
- On day two, twelve point three less ten held leaves an uncollateralized exposure of two point three: the threshold and minimum transfer leave residual risk.

28 CCP margin against OTC collateral

Same job, different design

Feature	CCP margin | OTC collateral
Terms, assets, haircuts	Standard | Negotiated
Direction	Two-way | Maybe one-way
Residual exposure	Little | Threshold, lag
Posted assets	Strict rules | May be reused
Initial margin	Always | Large dealers only

IN THE LESSON

- Now weigh the two systems.
- A central counterparty's margin is standardized, with set rules, while the terms of an over the counter credit support annex are negotiated: threshold, minimum transfer amount, eligible assets, and haircuts on those assets.
- Central counterparty margin is always two way, while over the counter collateral may flow in one direction only.
- Margin at a clearing house leaves little residual exposure, while over the counter collateral leaves exposure from the threshold and from the margin period of risk, the lag between the last call and the close out.
- Posted collateral may be reused by the receiver, so the poster can become an unsecured creditor.
- And initial margin is always taken at a clearing house, while in non cleared trades only large dealers exchange it.

29 Special purpose vehicles

- SPV: separate legal entity, ring-fenced from sponsor
- Derivative product company: top rating for clients
- Well capitalized; hedged, often by a mirror trade
- Wind-down triggered before capital is exhausted
- Strength = capital, structure; not a parent guarantee

IN THE LESSON

- Finally, special purpose vehicles.
- A special purpose vehicle is a separate legal entity whose assets and liabilities are ring fenced from its sponsor, which makes it bankruptcy remote.
- In over the counter derivatives, dealers have set up derivative product companies, subsidiary vehicles that trade with counterparties who need a top credit rating even though the parent is rated lower.
- The vehicle is well capitalized and keeps its market risk small by hedging, often through a mirror trade with the parent.
- It also follows rules that trigger a wind down before its capital is exhausted.
- The key point is that its strength rests on capital and structure, not on a parent guarantee.
- These vehicles are also used in securitization, where a dealer's swap with the vehicle can be repaid only from the vehicle's assets.

30 Example 13: sharing an SPV's assets

Assets of 60 shared pro rata among equal-ranking claims

Total claims	50 + 30 + 20	**100**
Recovery rate	60 ÷ 100	**60%**
Largest claim, 50	50 × 60%	**30**
Middle claim, 30	30 × 60%	**18**
Smallest claim, 20	20 × 60%	**12**

IN THE LESSON

- Example thirteen, a termination.
- An illustration, in millions.
- A derivative vehicle is wound up with assets of sixty.
- Three counterparties have claims of fifty, thirty and twenty, a total of one hundred.
- Because the claims rank equally, they share the assets pro rata.
- The recovery rate is sixty divided by one hundred, sixty per cent.
- So the largest claim, fifty, receives fifty times sixty per cent, thirty.
- The middle claim, thirty, receives thirty times sixty per cent, eighteen.
- And the smallest claim, twenty, receives twenty times sixty per cent, twelve.
- The three payments add to sixty, all of the assets.
- No counterparty is paid ahead of another, and no parent guarantee tops up the shortfall.
- That is why capital and early wind down rules matter so much.

31 Four mistakes to avoid

- A CCP ends risk? No: it concentrates and shares it
- Call tops up to maintenance? No: back to initial
- Net everything? Only enforceable, in-set trades
- Same call formula? Long: price falls. Short: rises

IN THE LESSON

- Four mistakes to avoid.
- Mistake one: thinking a central counterparty removes counterparty risk.
- It concentrates the risk and shares it among members; margin and the default waterfall are what contain it.
- Mistake two: topping up a margin call only to the maintenance level.
- The deposit must restore the initial margin.
- Mistake three: assuming netting always works.
- It cuts exposure only where it is legally enforceable, and only for trades inside the same netting set; and the exposure is the net sum floored at zero.
- Mistake four: using the wrong margin call formula.
- A long position is called when the price falls, a short position when the price rises, and the formulas differ in sign.

32 Recap: the main ideas

- CCP: novation, margin, daily settlement, waterfall
- After the crisis: clearing, repositories, compression
- Netting: exposure = max(net sum, 0) in one set
- Margin: calls restore initial; long falls, short rises
- Exchange: standard. OTC: tailored; collateral, SPVs

IN THE LESSON

- Let's pull it together.
- A clearing house steps in by novation, becomes buyer to every seller, and contains risk with margin, daily settlement, a default fund and a loss waterfall.
- Since the crisis, clearing, repositories, compression and payment versus payment have lowered risk.
- Close out netting makes exposure the net sum, floored at zero, inside one netting set.
- Futures margin has initial, variation and maintenance levels, with calls restoring the initial level.
- Stock bought on margin is called at a lower price for a long position and a higher price for a short.
- Exchanges offer standardized contracts and low credit risk; the over the counter market offers tailoring at the cost of credit risk, which collateral and special purpose vehicles help to manage.

33 Try three quick questions

1. Long 4 contracts × 250 units, price falls by 3. Result?
   Answer: −3 × 250 × 4 = −3,000, a loss of 3,000.
2. Trades +10, −7, +2 under one master agreement. Exposure?
   Answer: Netted: max(5, 0) = 5. Not netted: 10 + 2 = 12.
3. Buy on margin at $60 (long), initial 50%, maint. 30%. Call price?
   Answer: 60 × 0.50 ÷ 0.70 = $42.86.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one, and check the answers on the board.
- Question one.
- A trader is long four futures contracts of two hundred and fifty units each, and the price falls by three.
- What is the gain or loss?
- Question two.
- Under one master agreement you hold trades worth plus ten, minus seven and plus two.
- What is the exposure with close out netting, and without netting?
- Question three.
- You buy stock at sixty dollars with an initial margin of fifty per cent and a maintenance margin of thirty per cent.
- At what price do you receive a margin call?
- The answers are on the board.