Credit default swaps: pricing and uses

Fixed Income

1 A story: insurance on a loan

- Harbor owns $10m of Marlow Foods bonds
- It pays a yearly premium to a dealer
- If Marlow defaults, the dealer pays the loss
- That policy is a credit default swap

IN THE LESSON

- Imagine a small fund called Harbor that owns ten million dollars of bonds issued by a food company, Marlow Foods.
- Harbor worries.
- It cannot sell the bonds without moving the price, and it likes the company, but it wants to sleep at night.
- So it goes to a dealer and buys a kind of insurance policy.
- Harbor pays a small amount every year.
- If Marlow Foods fails to pay its debts, the dealer pays Harbor for the loss.
- That policy is a credit default swap.
- Harbor is the protection buyer, the dealer is the protection seller, and Marlow Foods is the reference entity.

2 The contract in five words

- Notional: the amount of protection
- Spread: the yearly price of protection
- Coupon: a standard rate; the gap is paid upfront
- Reference entity: the borrower covered
- Credit event: the trigger for a payout

IN THE LESSON

- Here is the contract in five pieces, as a quick reminder.
- The notional is the amount of protection bought.
- The spread, or premium, is the yearly price.
- Contracts today pay a fixed standard coupon, and any difference from the fair spread is settled with an upfront payment, which we price later.
- The reference entity is the borrower being protected against.
- And the credit event is the trigger that makes the seller pay.
- The buyer keeps paying until the contract ends or a credit event occurs, whichever comes first.
- This first part is all about the trigger and about how the payout is worked out.

3 What counts as a credit event

Which events make the protection seller pay

Event	Pays out?
Bankruptcy	Yes
Failure to pay	Yes
Restructuring	Often
Succession event	No payout

IN THE LESSON

- Not every bad day for a company is a credit event.
- The contract lists the triggers.
- Bankruptcy is one: the company is insolvent or goes into a formal process.
- Failure to pay is another: it misses a payment on its debt and the grace period runs out.
- Restructuring is the tricky one.
- If the creditors are made worse off, say with a lower coupon, a longer maturity or a lower principal, many contracts treat it as a credit event, though some standard contracts limit or exclude it.
- A merger that moves the debt to a new company is different.
- That is a succession event, and it changes who the reference entity is rather than paying out.

4 Who decides, and what a succession event does

- A determinations committee rules on the event
- It also says which bonds can be delivered
- Succession event: debt moves to a new entity
- No default, no payout: the reference entity changes

IN THE LESSON

- Who says that an event has really happened?
- Not the buyer and not the seller, because each has an interest.
- A determinations committee decides.
- It is a panel of dealers and investors, and it votes on whether a credit event has occurred and which obligations may be delivered.
- This keeps the market consistent, so everyone settles on the same facts.
- Now picture a succession event.
- Marlow Foods merges into a bigger company that takes on its bonds.
- Nobody has defaulted.
- So there is no payout.
- The protection simply follows the debt to a new reference entity.
- The exam trap is to call a merger a default.

5 Two ways to settle

Physical settlement

Buyer delivers defaulted bonds → Seller pays face value → Seller keeps the bonds

Cash settlement

Auction sets recovery → Seller pays face less recovery → Buyer keeps the bonds

IN THE LESSON

- Once the committee confirms a credit event, the contract has to be settled, and there are two ways.
- Look at the top row first, physical settlement.
- The buyer delivers defaulted bonds and receives the full notional in cash.
- The seller is left holding the bonds.
- Now the bottom row, cash settlement.
- An auction on the cheapest to deliver bond fixes a recovery price, say thirty five per cent of face value.
- The seller pays the buyer the notional times one minus the recovery, which is the loss, and nothing else changes hands.
- Both routes end in the same place for a buyer who owned the bonds.
- Cash settlement also suits a buyer who never owned any bonds.

6 The cash settlement payment

Payment = Notional × (1 − Recovery rate)

Notional	Protection bought
Recovery rate	Auction price, share of face
Cash settlement payment	What the seller pays

IN THE LESSON

- Here is the payout rule for cash settlement.
- The seller pays the notional times one minus the recovery rate.
- Take the pieces.
- The notional is the amount of protection bought.
- The recovery rate is what the defaulted bonds turn out to be worth, expressed as a share of face value, and an auction usually sets it using the cheapest to deliver obligation.
- One minus the recovery rate is the loss, sometimes called the loss given default.
- So the seller pays the loss, not the recovery.
- With a notional of ten million dollars and a recovery of thirty five per cent, the loss is sixty five per cent, and the payment is six and a half million dollars.

7 Example 1: Harbor's payout

$10m protection, auction recovery 35%, Harbor's bonds at 40

Credit event	committee confirms	**Failure to pay**
Auction recovery	cheapest-to-deliver bond	**35%**
Cash payout	$10m × (1 − 0.35)	**$6.5m**
Harbor's own bonds	$10m × 0.40	**$4.0m**
Harbor ends with	$6.5m + $4.0m	**$10.5m**

Pay the loss, not the recovery ($3.5m is wrong)

IN THE LESSON

- Let us run Harbor through a default.
- Marlow Foods misses a coupon, the grace period ends, and the committee confirms a failure to pay.
- An auction on the cheapest bond sets recovery at thirty five per cent.
- Harbor bought ten million dollars of protection, so the cash payment is ten million times one minus zero point three five.
- That is six and a half million dollars.
- Harbor's own bonds are not the cheapest ones, and they trade at forty.
- They are worth four million.
- Add the two and Harbor holds ten and a half million dollars, a little more than par.
- The trap is paying the recovery, three and a half million, instead of the loss.

8 Pricing: two legs that must match

- Premium leg: coupons paid until default or maturity
- Protection leg: the loss, paid only on default
- Fair spread: the two present values are equal
- Inputs: hazard rate and recovery rate

IN THE LESSON

- Now to pricing.
- Think of a fair bet between two friends.
- They agree a stake so that neither expects to win.
- A credit default swap is priced the same way.
- The premium leg is what the buyer pays: the coupons, quarter by quarter, until default or maturity.
- The protection leg is what the seller pays: the loss, but only if there is a default.
- The market sets the spread so that the present value of the protection leg equals the present value of the premium leg.
- Both legs depend on two things: how likely default is, called the hazard rate, and how much is recovered if it happens.

9 The spread in one line

Spread ≈ Hazard rate × (1 − Recovery)

CDS spread	Yearly price of protection
Hazard rate	Yearly chance of default
Loss given default: 1 minus recovery	Loss if default happens

IN THE LESSON

- Here is the shortcut the exam expects.
- The spread is roughly the hazard rate times one minus the recovery.
- The hazard rate is the yearly chance of default, given that the company has survived so far.
- One minus the recovery is the loss if it happens.
- Multiply them and you get the expected loss each year, and that is what a buyer should be paying for.
- Turn it around and the hazard rate is about the spread divided by one minus the recovery.
- A spread of one point eight per cent with forty per cent recovery implies a hazard rate of one point eight divided by zero point six, which is three per cent.

10 Example 2: from spread to hazard rate

Five-year spread 1.80%, expected recovery 40%

Market spread	five-year protection	**1.80%**
Expected recovery	assumed	**40%**
Hazard rate	1.80% ÷ (1 − 0.40)	**3.0%**
Check	3.0% × 0.60	**1.80%**
Recovery 30% instead	1.80% ÷ 0.70	**2.6%**

Lower recovery: less default risk explains the same spread

IN THE LESSON

- Example two.
- An analyst, Priya, sees that five year protection on Marlow Foods costs one point eight per cent a year, and she assumes forty per cent recovery.
- She divides one point eight by one minus zero point four, which is zero point six.
- The answer is three per cent.
- In words, the market is charging as if there were a three per cent chance of default each year.
- She checks it backwards: three per cent times zero point six is one point eight.
- Then she asks what changes if recovery is only thirty per cent.
- The divisor falls to zero point seven and the hazard rate drops to about two point six per cent.
- A lower recovery assumption means less default risk is needed to explain the same spread.

11 Spread, hazard rate and recovery

Chart: CDS spread (%) vs Hazard rate (% a year)

- Recovery 20%
- Recovery 40%
- 3% hazard gives 1.80%

IN THE LESSON

- Let us draw the relationship.
- Along the bottom is the hazard rate, the yearly chance of default.
- Up the side is the spread.
- Both start at zero.
- Now the lines.
- Each line is the spread equal to the hazard rate times the loss, so each is a straight line from the corner.
- The lower line is forty per cent recovery.
- The steeper line is twenty per cent recovery, where the loss is bigger, so the same hazard rate costs more.
- Mark the example: at a hazard rate of three per cent, the lower line reads one point eight per cent.
- The message is simple.
- Spreads rise with the chance of default and fall with the amount recovered.

12 What moves the price

- Hazard rate: weaker credit, wider spread
- Recovery rate: higher recovery, narrower spread
- Maturity and the shape of the credit curve
- Discount rates, liquidity, demand for protection

IN THE LESSON

- What pushes a spread around?
- First, the hazard rate.
- Weaker earnings, heavier debt or a gloomy economy all raise the chance of default, so spreads widen.
- Second, the expected recovery.
- Secured debt or a firm with valuable assets means a higher recovery, a smaller loss and a lower spread.
- Third, maturity and the shape of the credit curve: longer protection covers more years of risk and usually costs more.
- Fourth, the discount rate, because both legs are present values.
- Fifth, liquidity and demand for protection, and the counterparty risk of the seller.
- These last two can move spreads even when nothing has changed in the company.

13 The upfront payment

Upfront ≈ (Spread − Coupon) × Duration × Notional

Spread minus coupon	Positive: buyer pays
CDS duration	Present value of $1 a year
Notional	Protection bought
Upfront paid by the buyer	Cash settled at the start

IN THE LESSON

- Today most contracts carry a fixed standard coupon, such as one per cent or five per cent, whatever the credit really deserves.
- So at the start, the two sides must settle the difference in cash.
- The upfront payment is about the spread minus the coupon, times the CDS duration, times the notional.
- The CDS duration is the present value of one dollar a year of premium, allowing for the chance that default stops the payments early.
- If the spread is above the coupon, the buyer pays the upfront, because the coupon undercharges.
- If the spread is below the coupon, the seller pays, because the coupon overcharges.

14 Example 3: the upfront payment

$10m, spread 2.50%, coupon 1%, duration 4.5

Fair spread	market	**2.50%**
Standard coupon	fixed by contract	**1.00%**
Spread gap	2.50% − 1.00%	**1.50%**
Upfront paid	1.50% × 4.5 × $10m	**$675,000**
Price per 100	100 − 6.75	**93.25**

Spread below the coupon: the seller pays the upfront

IN THE LESSON

- Example three.
- Harbor now buys ten million dollars of five year protection at the market spread of two and a half per cent.
- The standard coupon is one per cent and the CDS duration is four point five.
- The spread gap is one and a half per cent.
- Multiply one and a half per cent by four point five by ten million, and the upfront payment is six hundred and seventy five thousand dollars, paid by Harbor.
- Quoted as a price per hundred, that is one hundred minus six point seven five, or ninety three point two five.
- Had the spread been only sixty basis points, below the coupon, the sum would be negative, and the seller would pay Harbor a hundred and eighty thousand dollars.

15 Where the upfront comes from

Present value ($000)

Protection leg	**1,125**
Coupons at 1%	**450**
Upfront paid	**675**

1,125 − 450 = 675

IN THE LESSON

- Here is the same example as bars, in thousands of dollars.
- The first bar is the protection leg.
- A fair premium of two and a half per cent a year, over a duration of four point five, on ten million dollars, is worth one million one hundred and twenty five thousand.
- The second bar is what the buyer will actually pay through coupons.
- One per cent, over the same duration, is worth four hundred and fifty thousand.
- The third bar is the gap between them, six hundred and seventy five thousand.
- That gap is the upfront.
- Without it, the buyer would receive protection worth more than the coupons it pays, and the two legs would not balance.

16 Gains and losses after the trade

Seller's value change ≈ − Change in spread × Duration × Notional

Change in spread	New spread minus old spread
CDS duration	Present value of $1 a year
Notional	Protection bought or sold
Value change	Buyer gains, seller loses

IN THE LESSON

- Once the trade is done, the spread keeps moving, and the value of the contract moves with it.
- For the protection seller, the change in value is about minus the change in spread, times the duration, times the notional.
- A rise in spread is bad for the seller, because it now guarantees a riskier credit at an old price.
- The sign reverses for the buyer, who gains when spreads widen.
- That is why buying protection is called a short credit position.
- It is like being short a bond: you win when the credit deteriorates.
- The same formula also works for a small narrowing in spreads.

17 Example 4: the spread moves

Spread moves from 2.50%; $10m, duration 4.5

Spread widens	2.50% to 3.00%	**+0.50%**
Buyer gains	0.50% × 4.5 × $10m	**+$225,000**
Seller loses	same amount	**−$225,000**
If it narrows to 2.00%	buyer loses	**−$225,000**

Protection gains value as the credit weakens

IN THE LESSON

- Example four, the same Harbor contract a few months later.
- Bad news about Marlow Foods pushes its spread from two and a half to three per cent, a widening of half a per cent.
- For Harbor, the buyer, the gain is zero point five per cent times four point five times ten million, which is two hundred and twenty five thousand dollars.
- The dealer, the seller, loses exactly the same amount.
- Now flip the news.
- If the spread had narrowed to two per cent, Harbor would have lost two hundred and twenty five thousand dollars and the dealer would have gained it.
- Time also matters.
- As the contract ages, the duration shrinks, and the same spread move changes value by less.

18 Four mistakes to avoid

- 1. Paying the recovery instead of the loss
- 2. Merger called a default; buyer judging the event
- 3. Upfront sign wrong when spread exceeds coupon
- 4. Gains and losses swapped for buyer and seller

IN THE LESSON

- Before we move on, the common slips so far.
- One.
- Paying the recovery instead of the loss.
- The seller pays notional times one minus recovery.
- Two.
- Treating a succession event, such as a merger, as a default, or letting the buyer decide whether a credit event has happened.
- The committee decides.
- Three.
- Using the wrong sign on the upfront.
- When the spread is above the coupon the buyer pays.
- Four.
- Mixing up who gains when spreads move.
- Spreads widen, protection buyers gain.
- Spreads narrow, protection sellers gain.
- Keep one picture in your head: the buyer is short credit, and the seller is long credit.

19 Using the swap to manage exposure

- Bank holds a loan it cannot sell
- Buy protection: keep the loan, shed the default risk
- Sell protection: take credit exposure with no bond
- Buyer is short credit; seller is long credit

IN THE LESSON

- Now to uses.
- The first is managing credit exposure without touching the bonds or loans.
- Picture a bank that has lent twenty million dollars to Marlow Foods.
- It values the relationship and cannot sell the loan, but its risk managers say the exposure is too large.
- The bank buys protection on twenty million dollars.
- It keeps the loan and passes the default risk on.
- The reverse works too.
- An investor who likes the credit, but has no cash or cannot find the bonds, sells protection, collects the premium, and takes on the exposure.
- Selling protection is a long credit position, and buying protection is short credit.

20 Example 5: hedging a loan

$20m loan, $20m protection at 2.50%, recovery 40%

Loan held	cannot be sold	**$20m**
Buy protection	$20m notional	**Short credit**
Yearly cost	2.50% × $20m	**$500,000**
If default: payout	$20m × (1 − 0.40)	**$12.0m**
Loan plus payout	$8.0m + $12.0m	**$20.0m**

IN THE LESSON

- Example five.
- The bank holds a twenty million dollar loan to Marlow Foods and buys twenty million of five year protection at a spread of two and a half per cent.
- To keep things simple, treat the cost as a yearly premium of two and a half per cent.
- That is five hundred thousand dollars a year.
- Now suppose Marlow defaults and the auction sets recovery at forty per cent.
- The loan is worth eight million dollars.
- The protection pays twenty million times sixty per cent, twelve million.
- Eight plus twelve is twenty million, so the bank is made whole.
- The price of that comfort is the yearly premium, paid whether or not default ever comes.

21 Views on the level of spreads

What to trade for each view

View	Trade
Spreads to widen	Buy protection
Spreads to narrow	Sell protection
Curve to steepen	Sell short, buy long
Curve to flatten	Buy short, sell long

IN THE LESSON

- Now a second use: taking a view.
- A view on the level of spreads is the simplest.
- If you expect the credit to get worse, spreads to widen, buy protection.
- You are short credit, and you gain when spreads rise.
- If you expect spreads to narrow, sell protection.
- You are long credit, and you collect the premium as the credit improves.
- Views on the shape of the credit curve need two legs.
- If you expect the curve to steepen, with long maturity spreads rising more than short ones, sell short dated protection and buy long dated protection.
- If you expect it to flatten, do the opposite.
- Learn the table by heart, and check the legs against the picture of the curve.

22 Example 6: a view on the level

Sell $10m protection, duration 4.5, spread 2.50%

View	good results	**Spreads narrow**
Spread moves	2.50% to 2.10%	**−0.40%**
Seller gains	0.40% × 4.5 × $10m	**$180,000**
If it widens 0.40% instead		**−$180,000**

IN THE LESSON

- Example six.
- Priya thinks Marlow Foods is about to report strong results, so she expects its spread to tighten from two and a half per cent to two point one per cent.
- She sells ten million dollars of five year protection.
- Her view is a narrowing of zero point four per cent.
- With a duration of four point five, her gain is zero point four per cent times four point five times ten million, which is a hundred and eighty thousand dollars.
- Remember, a seller gains when spreads narrow.
- If she is wrong and the spread widens by the same zero point four per cent instead, she loses a hundred and eighty thousand.
- The payoff is symmetric for small moves, and large only in a default.

23 A steepening credit curve

Chart: CDS spread vs Maturity (2 to 10 years)

- Today
- After steepening

IN THE LESSON

- Here is a view on shape, drawn.
- Along the bottom is maturity, from two years on the left to ten years on the right.
- Up the side is the CDS spread.
- The grey line is today's credit curve for Marlow Foods.
- It slopes up, because longer protection costs more, from one per cent at two years to two per cent at ten, a gap of one hundred basis points.
- The green line is what the investor expects after a steepening.
- The short end rises twenty basis points.
- The long end rises fifty.
- Both ends moved up, but the gap between them has grown from one hundred to one hundred and thirty.
- That change in the gap is the view being traded.

24 Sizing a curve trade

Leg profit ≈ Notional × Duration × Change in spread
Short-leg notional = Long notional × Long duration ÷ Short duration

Notional	Protection on one leg
CDS duration	Longer maturity, longer duration
Change in spread	Change in that leg's spread
Profit on one leg	Gain or loss on one leg

IN THE LESSON

- A curve trade has two legs, and the trick is sizing them.
- The profit on a single leg is about the notional times the duration times the change in spread.
- Long dated protection has a much larger duration than short dated protection, because it covers more years.
- So if you buy and sell the same notional, a parallel move in the whole curve would not cancel.
- The long leg would win or lose far more than the short one.
- To remove the exposure to the level, size the short leg so that notional times duration is equal on both legs.
- That means the short leg notional equals the long leg notional times the long duration divided by the short duration.

25 Example 7: a steepener, sized

10-year duration 8.0, 2-year duration 1.9; 10y +50bp, 2y +20bp

Buy 10-year protection	$10m × duration 8.0	**80m**
Sell 2-year protection	80m ÷ 1.9	**$42.1m**
Parallel +50bp	$400,000 − $400,000	**$0**
Steepening	$400,000 − $160,000	**$240,000**

IN THE LESSON

- Example seven.
- Priya expects the Marlow credit curve to steepen but has no view on the level.
- She buys ten million dollars of ten year protection with a duration of eight.
- Notional times duration is eighty million.
- Two year protection has a duration of one point nine, so she sells eighty divided by one point nine, about forty two point one million dollars of two year protection.
- Now test it.
- If the whole curve moves up by fifty basis points, the long leg gains four hundred thousand and the short leg loses four hundred thousand, a net of zero.
- Now the real steepening: the ten year rises fifty and the two year rises twenty.
- She gains four hundred thousand and loses one hundred and sixty thousand, a profit of two hundred and forty thousand dollars.

26 One credit, many markets

- Same credit risk is priced in bonds, loans and swaps
- Equity also reflects the credit's fortunes
- Gaps open between markets
- Buy the cheap leg, sell or hedge the dear one

IN THE LESSON

- Now the last idea.
- The same company's credit risk is priced in many places at once: its bonds, its loans, the swap, and, less directly, its shares.
- Imagine two market stalls selling the same apple at different prices.
- If you could buy at one and sell at the other, you would.
- Markets for credit are not quite that tidy, but gaps do open, and a credit default swap is often the cleanest tool to hold one side and hedge the other.
- The key skill is deciding which instrument is cheap.
- The cheap one you buy.
- The expensive one you sell, or you hedge against it.

27 Two issuers, two bases

Spread over benchmark (%)

Bond A	**2.60%**
CDS A	**2.10%**
Bond B	**1.80%**
CDS B	**2.30%**

A: bond pays more than protection costs. B: the reverse.

IN THE LESSON

- Look at the bars.
- They show spreads for two different issuers, in per cent.
- On the left, the first issuer: its bond pays two point six over the benchmark, but protection on the same name costs only two point one.
- Own the bond, buy the protection, and you keep most of the pay with default risk largely removed.
- On the right, the second issuer is the reverse.
- Its bond pays only one point eight, while protection costs two point three.
- Here protection is the expensive side.
- The gap between the swap spread and the bond spread is called the basis, and its sign tells you which way to trade.

28 The CDS bond basis

Basis = CDS spread − Bond spread

CDS spread	Price of protection
Bond spread over benchmark	Yield above the benchmark
Basis	Negative: buy bond and protection

IN THE LESSON

- The basis is the CDS spread minus the bond spread over the benchmark, for the same maturity.
- Order matters, so say it with me: swap minus bond.
- A negative basis means the bond pays more than protection costs for the same credit risk.
- The bond is cheap, or protection is cheap, depending on how you look at it, and the trade is to buy the bond and buy protection.
- You earn the difference while the default risk is hedged.
- A positive basis is the mirror: protection is dear next to the bond.
- Sell protection and short the bond.
- In practice, funding costs, delivery options and liquidity stop the basis from being exactly zero.

29 Example 8: a negative basis trade

$10m: bond 2.60% over benchmark, five-year CDS 2.10%

Basis	2.10% − 2.60%	**−0.50%**
Buy the bond	earns 2.60% × $10m	**$260,000**
Buy protection	pays 2.10% × $10m	**−$210,000**
Net carry a year	default risk hedged	**$50,000**

Default: bond loses $6.0m, protection pays $6.0m

IN THE LESSON

- Example eight.
- A manager has ten million dollars and finds the Marlow five year bond paying two point six per cent over the benchmark, while five year protection costs two point one per cent.
- The basis is two point one minus two point six, which is minus zero point five per cent.
- Negative, so the manager buys the bond and buys protection.
- The bond earns two point six per cent, two hundred and sixty thousand dollars a year.
- Protection costs two hundred and ten thousand.
- The net carry is fifty thousand dollars a year, with the credit risk hedged.
- If Marlow defaults and the bond falls to forty, the bond loses six million and protection pays six million.
- The trap is running the trade backwards.

30 Shares and credit can disagree

Equity market

Buyout rumoured → Bid at a premium → Share price rises

Credit market

Deal funded by debt → Default risk rises → Spreads should widen

IN THE LESSON

- Equity and credit can also disagree.
- Picture a rumoured leveraged buyout of Marlow Foods.
- Follow the top row.
- A buyer is expected to bid for the company, usually at a premium, so the share price rises.
- Now the bottom row.
- The buyer will borrow heavily and put that debt on Marlow's balance sheet.
- More debt means a higher chance of default, so the old creditors are worse off and spreads should widen.
- Shareholders cheer and bondholders worry, yet the swap spread may not have moved yet.
- If you believe the buyout is real, you can buy the shares and also buy protection.
- Either market can pay, because both are reacting to the same event.

31 Example 9: shares and protection

100,000 shares at $50; $5m protection, duration 4.0

Buy shares	100,000 at $50	**$5.0m**
Bid lifts shares to $60	+$10 × 100,000	**$1,000,000**
Spread widens	1.50% to 2.50%	**+1.00%**
Protection gains	1.00% × 4.0 × $5m	**$200,000**
Total gain	$1,000,000 + $200,000	**$1,200,000**

If the deal fails, both legs can lose

IN THE LESSON

- Example nine.
- A fund buys one hundred thousand Marlow shares at fifty dollars, five million dollars in all, and also buys five million of five year protection.
- The spread is one and a half per cent and the duration is four.
- A buyout bid arrives.
- The share price jumps to sixty.
- That is ten dollars on one hundred thousand shares, a gain of one million dollars.
- The debt financing pushes the spread out to two and a half per cent, a widening of one per cent.
- The protection gains one per cent times four times five million, two hundred thousand dollars.
- Together, one million two hundred thousand.
- Be honest about the risk, though.
- If the deal collapses, the shares can fall and the spread can tighten.

32 Other gaps, and the trap

- Index versus its constituent names
- Loans versus bonds of the same issuer
- Funding, delivery option and liquidity keep gaps open
- Negative basis: buy bond and buy protection

IN THE LESSON

- A few more places to look for gaps.
- An index of credit default swaps can trade away from the average of its constituent names, and a manager can buy the cheap side and sell the other.
- Loans and bonds of the same issuer can be priced differently, perhaps because one is secured and the other is not, or one trades less often.
- Remember why gaps last: bonds must be funded, the buyer of protection can choose the cheapest bond to deliver, and liquidity differs between markets.
- These frictions mean such trades carry risk.
- And now the big trap.
- The exam loves the direction of the basis trade.
- Negative basis: buy the bond, buy protection.
- Positive basis: the reverse.

33 Recap: the formulas to remember

Payment = N × (1 − R) Spread ≈ Hazard × (1 − R)
Upfront ≈ (Spread − Coupon) × Duration × N
Buyer gain ≈ Δ Spread × Duration × N Basis = CDS − Bond

Cash settlement payment	Loss, not recovery
Hazard rate	About spread ÷ (1 − R)
Upfront paid by the buyer	Buyer pays if spread > coupon
Profit on one leg	Size curve legs by duration
Basis	Negative: buy bond, buy cover

IN THE LESSON

- Let us pull it together.
- Cash settlement pays the notional times one minus the recovery: the loss, not the recovery.
- The determinations committee decides on credit events, and a succession event changes the reference entity without a payout.
- The spread is about the hazard rate times one minus the recovery.
- The upfront is the spread minus the coupon, times duration, times notional, paid by the buyer when the spread is above the coupon.
- After the trade, the buyer gains the change in spread times duration times notional.
- Curve trades are sized so that notional times duration is equal on each leg.
- And the basis is the swap spread minus the bond spread.

34 Try three quick questions

1. Notional $20m, recovery 25%. What does the seller pay in cash?
   Answer: $20m × 0.75 = $15m.
2. Spread 2.40%, recovery 40%. What hazard rate is implied?
   Answer: 2.40% ÷ 0.60 = 4.0% a year.
3. Bond spread 3.00%, CDS spread 2.40%. Which trade?
   Answer: Basis −0.60%: buy the bond and buy protection.

IN THE LESSON

- Now three quick questions for you.
- Pause after each one.
- Question one.
- A credit event occurs on a swap with a notional of twenty million dollars, and the auction sets recovery at twenty five per cent.
- How much does the seller pay in cash?
- Twenty million times seventy five per cent is fifteen million dollars.
- Question two.
- The spread is two point four per cent and expected recovery is forty per cent.
- What hazard rate is implied?
- Two point four divided by zero point six is four per cent.
- Question three.
- A bond pays three per cent over the benchmark, and protection costs two point four per cent.
- Which trade?
- The basis is minus zero point six per cent, so buy the bond and buy protection, and earn the gap.