Managing a credit portfolio

Portfolio Management

1 A story: the ship's captain

- A captain checks the weather before the route
- Start with growth, defaults, rates, policy
- Decide how much credit to hold at all
- Then split it by quality, sector, region, currency

IN THE LESSON

- A ship's captain does not start the day by studying single waves.
- She checks the weather, the tide and the season, and only then decides which route to take and how much cargo to carry.
- Top-down credit investing works the same way.
- Rosa starts with the big picture: growth, the credit cycle, default rates, interest rates and central bank policy.
- From those views she makes two decisions.
- First, how much credit exposure the fund should hold at all.
- Second, how to split it across quality tiers, sectors, regions and currencies.
- Picking individual bonds comes last, and it matters least.
- The first question is simply what the weather looks like for credit.

2 Where in the cycle are we?

Marlow Credit Fund: what the cycle suggests

Stage of the cycle	Favoured
Early recovery: spreads tighten	Lower quality
Late cycle: spreads widen	Higher quality
Recession: spreads widen more	Higher quality

IN THE LESSON

- Here is the rule of thumb Rosa uses, from the cycle you met earlier.
- Early in a recovery, defaults have passed their peak and spreads start wide, so spreads tend to tighten.
- Lower quality bonds had widened the most, so they tend to rebound the most.
- Rosa favours lower quality.
- Late in the cycle, leverage has built up, defaults start to creep up and dealers become cautious, so spreads tend to widen.
- Higher quality is preferred.
- In a recession the pattern is the same and stronger, and the shelter is again higher quality.
- A tilt needs a way to measure its size.

3 From the economy to the trade

The decisions

Macro views: growth, defaults, rates → How much credit overall → Split by tier, sector, region

The tools

Cash bonds → CDS indexes → Credit ETFs

IN THE LESSON

- Here is the whole top-down chain on one page.
- Read the top row from left to right.
- Rosa begins with macro views.
- Next comes the total amount of credit exposure the fund should carry.
- Then she splits that exposure across quality tiers, sectors, regions and currencies.
- The bottom row shows the tools that carry the decision out.
- Cash bonds give her the actual securities and their income.
- Credit default swap indexes give her broad exposure in a single trade, cheaply and quickly.
- Credit exchange traded funds give her easy access to a whole slice of the market.

4 Sizing the tilt: duration times spread

Duration times spread = spread duration × spread (bp)
Loss ≈ duration times spread × % widening

Spread duration	Price change per 1bp of spread
Spread in basis points	Wider for lower quality
Duration times spread	Compares tiers fairly

IN THE LESSON

- Now the measurement.
- You know spread duration from Level Two.
- It tells you the price change for a small change in spread, as if every bond's spread moved by the same number of basis points.
- In practice spreads move roughly in proportion to their level.
- A bond at four hundred basis points tends to move much further than one at one hundred.
- So multiply spread duration by the spread.
- That is duration times spread.
- The loss from a proportional widening is then duration times spread, times the percentage widening.
- When you compare rating tiers, use duration times spread, because it captures the larger spread moves of wider spread bonds.

5 Example 1: a move into high yield

IG: duration 6.0, 100bp. HY: duration 4.0, 400bp. Move 10% into HY

Duration times spread, IG	6.0 × 100	**600**
Duration times spread, HY	4.0 × 400	**1,600**
Spread duration after	0.9 × 6.0 + 0.1 × 4.0	**5.8**
Duration times spread after	0.9 × 600 + 0.1 × 1,600	**700**
Cost of a 20% widening	was 1.20%, now 1.40%	**1.40%**

IN THE LESSON

- Rosa's fund holds only investment grade bonds.
- That tier has spread duration six and a spread of one hundred basis points.
- High yield has spread duration four and a spread of four hundred.
- Expecting a recovery, she moves ten per cent of the fund into high yield.
- Duration times spread is six times one hundred, which is six hundred, for investment grade.
- For high yield it is four times four hundred, which is sixteen hundred.
- After the move, spread duration is point nine times six plus point one times four, which is five point eight.
- That looks lower, as if risk fell.
- Duration times spread is seven hundred, up from six hundred.
- If every spread widens by a fifth, the fund loses one point four per cent, not one point two.
- The right measure shows more risk, which suits her view.

6 Example 2: moving up in quality

Fund 70% IG, 30% HY. Target: duration times spread of 750

Before: spread duration	0.7 × 6.0 + 0.3 × 4.0	**5.4**
Before: duration times spread	0.7 × 600 + 0.3 × 1,600	**900**
High yield share needed	600 + 1,000 × x = 750	**15%**
After: spread duration	0.85 × 6.0 + 0.15 × 4.0	**5.7**
Cost of a 20% widening	was 1.80%, now 1.50%	**1.50%**

IN THE LESSON

- Later the recovery has matured and Rosa has kept adding.
- The fund is now seventy per cent investment grade and thirty per cent high yield.
- Spread duration is point seven times six plus point three times four, which is five point four.
- Duration times spread is point seven times six hundred plus point three times sixteen hundred, which is nine hundred.
- She sees the cycle turning and wants to cut duration times spread to seven hundred and fifty.
- Solve six hundred plus one thousand times the high yield share, equal to seven hundred and fifty.
- The share is fifteen per cent, so she sells half her high yield.
- Now the trap.
- Spread duration after the sale is five point seven, higher than before.
- Judged by spread duration alone, risk went up.
- By the better measure it fell, and a fifth widening now costs one point five per cent, not one point eight.
- The better measure guides the sale.

7 Risk by mix, on one scale

Duration times spread

All IG	**600**
90/10	**700**
85/15	**750**
70/30	**900**
All HY	**1,600**

IG/HY split of the fund

IN THE LESSON

- Here are the mixes as bars.
- The vertical axis is duration times spread, and each bar is one portfolio, labelled by its split of investment grade to high yield.
- The all investment grade fund is the shortest bar, six hundred.
- The ninety ten mix from Example One is seven hundred.
- The seventy thirty mix is nine hundred, and the eighty five fifteen mix that Rosa moved to is seven hundred and fifty.
- All high yield, on the right, towers at sixteen hundred.
- Notice that the bars rise with the high yield share, while spread duration, if you looked it up, would have fallen at every step.

8 A story: the last bus home

- Bonds trade over the counter through dealers
- Most issues trade rarely after the first weeks
- Dealer inventories are small next to the market
- In a sell-off the seat on the bus disappears

IN THE LESSON

- Think of the last bus home on a night when everyone leaves the same event at once.
- In quiet hours there is always a seat.
- At closing time, the bus is full, the queue is long and the driver can only carry so many.
- Corporate bonds are like that.
- Most trade over the counter through dealers, and most issues trade rarely after their first few weeks.
- Dealer inventories are small compared with the size of the market.
- In calm times a dealer will take your bond at a fair price.
- In a sell-off, when everyone wants to sell, dealers pull back, and the price you get falls just when you most need to sell.

9 From easy to sell to hard to sell

- Government bonds
- CDS indexes, ETFs
- Large, recent IG
- Older, smaller IG
- Small high yield

IN THE LESSON

- Here is a line of bonds from easiest to hardest to sell.
- On the far left are government bonds, the most liquid.
- Next come credit default swap indexes and credit exchange traded funds, which trade all day in size.
- Then larger, recently issued investment grade bonds, which dealers know and quote.
- Further right sit older, smaller investment grade issues, which hardly trade at all.
- On the far right is small, lower rated high yield, where bid-ask spreads are widest and widen most in a crisis.
- The further right a holding sits, the harder it is to sell when markets are stressed.

10 How a sell-off feeds itself

Stage one

Shock: investors rush to sell →
Dealers hold back → Bid-ask spreads widen

Stage two

Sellers accept lower prices →
Losses force more selling →
Spreads widen again

IN THE LESSON

- Here is why illiquidity bites hardest at the worst time.
- Follow the top row from left to right.
- A shock hits, perhaps worse economic news, and investors rush to sell bonds.
- Dealers, holding small inventories, step back and quote wider bid-ask spreads.
- Now the bottom row.
- Sellers who must sell accept lower prices to get out.
- Those lower prices create losses and push yet more investors and funds to sell.
- The cycle repeats.
- The key point for a manager is that transaction costs are not a fixed number.
- They multiply when you most need them.
- That is why Rosa never trusts a liquidity estimate taken in a quiet market.

11 What it costs to sell

Cost of selling, % of the amount sold (illustrative)

Where the bond sits	Calm → stress
Government bonds	0.05 → 0.10
Large, recent investment grade	0.20 → 0.80
Older, smaller investment grade	0.50 → 2.00
High yield	0.80 → 4.00

IN THE LESSON

- This table gives Rosa's cost of selling, as a percentage of the amount sold, in calm markets and in stress.
- These are made-up round figures for the idea, not market data.
- Government bonds cost five hundredths of one per cent to sell in calm times, and ten hundredths in stress.
- Large, recent investment grade bonds cost twenty hundredths, rising to eighty hundredths.
- Older, smaller investment grade issues cost half a per cent, rising to two.
- High yield costs eighty hundredths in calm times and four per cent in stress.
- Notice two things.
- Costs rise as quality and size fall.
- And every cost multiplies in stress, the worst ones the most.

12 Example 3: a redemption in a stressed week

$400m fund: buffer 40, large IG 200, older IG 100, HY 60; redeem 40

Pro rata, calm costs	2k + 40k + 50k + 48k	**$140,000**
Pro rata, stress costs	4k + 160k + 200k + 240k	**$604,000**
Stress against calm	604 ÷ 140	**4.3 times**
Buffer first, stress	$40m × 0.10%	**$40,000**
Saving from the buffer	604,000 − 40,000	**$564,000**

IN THE LESSON

- The Marlow fund now has four hundred million dollars.
- Forty million is a buffer of cash and government bonds.
- Two hundred million is large, recent investment grade, a hundred million is older investment grade, and sixty million is high yield.
- A client redeems forty million dollars.
- Selling a proportional slice of every holding at calm costs, the bill is one hundred and forty thousand dollars.
- At stress costs, the same sale costs six hundred and four thousand, more than four times as much.
- Now sell the buffer first, forty million at ten hundredths of one per cent.
- That costs forty thousand dollars.
- The saving is five hundred and sixty four thousand.
- But the buffer is now spent, and the rest of the fund is less liquid than before.
- It has to be rebuilt once markets calm down.

13 Example 4: how long to get out

Stress capacity per day: gov 20m, large 10m, older 4m, HY 2m

Government bonds	40m ÷ 20m a day	**2 days**
Large, recent IG	200m ÷ 10m a day	**20 days**
Older, smaller IG	100m ÷ 4m a day	**25 days**
High yield	60m ÷ 2m a day	**30 days**
Sellable in five days	40 + 50 + 20 + 10 = 120m	**30% of fund**

IN THE LESSON

- Cost is one side of illiquidity.
- Time is the other.
- Rosa stress tests how long each holding would take to sell.
- Assume the market can absorb only a limited amount a day in stress without a collapse in price.
- Government bonds, twenty million dollars a day.
- Large investment grade, ten million.
- Older investment grade, four million.
- High yield, two million.
- Divide each holding by its daily capacity.
- The buffer takes two days, large issues twenty days, older issues twenty five days, and high yield thirty days.
- In a single week of five days, Rosa can sell forty million of government bonds, fifty million of large issues, twenty million of older issues and ten million of high yield.
- That is a hundred and twenty million, thirty per cent of the fund.
- The rest is stuck.

14 How a credit fund limits the risk

Marlow's defences against illiquidity

Defence	What it does
Cash and government buffer	Sold first
Larger, newer bonds	Cheaper exit
CDS indexes, ETFs, total return swaps	Trade easily
Stress test of days to sell	Sets limits

IN THE LESSON

- Rosa has four main defences.
- First, a buffer of cash and government bonds, which is sold first and costs little.
- Second, a preference for larger and more recently issued bonds, which are cheaper to exit.
- Third, liquid instruments.
- Credit default swap indexes, exchange traded funds and total return swaps let her change exposure without trading hundreds of thin bonds, though they bring their own risks, such as counterparty risk and funds that trade away from their holdings' value.
- Fourth, the stress test we just ran, which sets limits on how much of the fund may sit in slow assets.
- Each defence costs some return.

15 Example 5: is the premium worth it?

Older IG spread 130bp against 100bp for large IG; $100m position

Extra spread	130 − 100	**30 bp**
Premium a year	$100m × 0.30%	**$300,000**
Calm exit cost	1.7 years of premium	**$500,000**
Stress exit cost	$100m × 2.00%	**$2,000,000**
Years of premium to repay stress	2,000,000 ÷ 300,000	**6.7 years**

IN THE LESSON

- Illiquidity is not always a problem.
- It can also be paid for.
- Suppose older investment grade bonds yield thirty basis points more than large recent ones, one hundred and thirty against one hundred.
- On a hundred million dollars, that is three hundred thousand dollars a year.
- Selling that holding in calm markets costs five hundred thousand dollars, which is about one point seven years of the extra spread.
- Selling in stress costs two per cent, two million dollars.
- That takes six point seven years of the premium to repay.
- So a fund that might be forced to sell should not count the premium as free money.
- A pension fund with long horizons and stable funding, that will never be forced to sell, can hold these bonds on purpose and collect it.

16 Mistakes so far

- Sizing quality shifts by spread duration
- Measuring liquidity only in calm markets
- Forgetting the buffer is spent once sold
- Treating the illiquidity premium as free money

IN THE LESSON

- Let us stop and collect the mistakes so far.
- First, sizing a shift between quality tiers with spread duration alone.
- Moving from high yield to investment grade can raise spread duration while cutting risk, as Example Two showed.
- Use duration times spread.
- Second, measuring liquidity in calm markets.
- Costs can multiply several times in a sell-off, so test in stress.
- Third, forgetting that the buffer is spent once you sell it.
- It has to be rebuilt, and the fund is less liquid in the meantime.
- Fourth, treating the illiquidity premium as free money.
- It pays only an investor who can wait.
- Keep these four in mind as we turn to tail risk.

17 A story: selling storm insurance

- Most months: steady spread income
- Rarely: large losses from defaults or blowouts
- In a crisis, correlations rise
- Negative skew and a fat left tail

IN THE LESSON

- Imagine you sell storm insurance.
- Most years you collect premiums and nothing happens.
- You feel clever.
- Then one year a hurricane arrives and wipes out a decade of income.
- A credit portfolio looks like that.
- Its return is mostly spread income, month after month.
- Now and then a default or a spread blowout produces a large loss.
- Statisticians call this negative skew.
- Worse, in a crisis the correlations between issuers rise, so the bonds you thought would diversify each other fall together.
- The returns have a fat left tail.
- So Rosa needs measures that look at the tail, and controls that act before the hurricane.

18 Credit returns have a fat left tail

Chart: How often vs Monthly return (illustrative)

- VaR 3.0%
- CVaR 5.5%
- Normal bell
- Credit: fat left tail

IN THE LESSON

- Here is the picture.
- The horizontal axis is the monthly return, losses on the left and gains on the right.
- The vertical axis is how often each return happens.
- The green curve is the normal bell shape that many models assume.
- The gold curve is a credit portfolio with the same centre but a fatter left tail.
- Look far to the left.
- The gold curve sits above the green one, so big losses happen more often than the bell predicts.
- The red line is the value at risk, a loss that only the worst months exceed.
- The second red line is conditional value at risk, five and a half per cent, the average loss in the tail beyond that line.

19 Value at risk and conditional VaR

Normal VaR = z × volatility − mean
CVaR = average loss beyond the VaR

z for the confidence level	1.65 at 95% confidence
Volatility	Monthly standard deviation
Mean return	Subtracted from the loss
Conditional VaR	Describes the tail

IN THE LESSON

- Two measures work together.
- Value at risk gives a loss threshold at a chosen confidence level.
- For normally distributed returns, the loss is z times volatility, minus the mean, where z is one point six five for ninety five per cent confidence.
- It says nothing about how bad things get beyond that threshold.
- Conditional value at risk, also called expected shortfall, fills the gap.
- It is the average of the losses beyond the value at risk.
- Because credit tails are fat, the second figure describes the danger better.
- A fund can have the same value at risk as another and a much worse tail.
- Limits are better set on conditional value at risk.

20 Example 6: normal against simulated

Worst 10 of 200 months: 12, 9, 7, 5.5, 4.5, 4, 3.6, 3.3, 3.1, 3 (%)

Normal 95% VaR	1.65 × 1.5% − 0.4%	**2.08%**
Simulated 95% VaR	10th worst of 200 months	**3.00%**
Conditional VaR	sum of the 10 = 55.0; ÷ 10	**5.50%**
CVaR against VaR	5.50 ÷ 3.00	**1.8 times**

IN THE LESSON

- Monthly returns on Rosa's fund have a mean of point four per cent and volatility of one point five.
- A normal model gives ninety five per cent value at risk of one point six five times one point five, minus point four, which is two point zero eight per cent.
- Rosa also simulates two hundred months.
- The worst ten, the five per cent tail, lose twelve, nine, seven, five and a half, four and a half, four, three point six, three point three, three point one and three per cent.
- The simulated value at risk is the smallest of these, three per cent.
- The average of the ten is conditional value at risk, five point five per cent.
- That is one point eight times the value at risk.
- The tail is where the danger sits.

21 The same fund in dollars

Loss on the $500m fund ($m)

Normal VaR	**10.4**
Simulated VaR	**15.0**
CVaR	**27.5**
Worst month	**60.0**

Monthly, 95% confidence

IN THE LESSON

- Now in dollars on the five hundred million dollar fund.
- The vertical axis is the loss in millions.
- The normal value at risk is the first bar, ten point four million.
- The simulated value at risk is next, fifteen million.
- Conditional value at risk is twenty seven point five million, the average loss when a bad month arrives.
- The last bar is the single worst simulated month, sixty million.
- Notice the gap between the first bar and the third.
- A manager who set limits on the normal figure would have prepared for less than half the typical bad month.
- The fat tail is why the normal assumption cannot be trusted.

22 Example 7: incremental and relative VaR

Fund $500m; add $50m of lower rated bonds; active risk 0.8% a month

VaR before	simulated, 95%	**$15.0m**
VaR after adding $50m	recomputed	**$17.0m**
Incremental VaR	2.0 ÷ 50m = 4.0% vs 3.0%	**$2.0m**
Relative VaR	1.65 × 0.8%	**1.32%**
Relative VaR in dollars	1.32% × $500m	**$6.6m**

IN THE LESSON

- Two more measures help Rosa decide.
- Incremental value at risk shows how the fund's value at risk changes when she adds a position.
- Before, the simulated value at risk was fifteen million dollars.
- She adds fifty million dollars of lower rated bonds, funded from cash, and recomputes.
- It is now seventeen million, so the incremental value at risk is two million.
- Per dollar added, that is four per cent, more than the fund's three per cent, so the new bonds add more risk than average.
- Relative value at risk measures risk against a benchmark.
- If active risk is point eight per cent a month, relative value at risk is one point six five times point eight, which is one point three two per cent, or six point six million dollars on five hundred million.
- That is a loss against the index.

23 Example 8: a stress test and a hedge

Fund $500m, 70% IG, 30% HY. Every spread widens by half

IG loss	$350m × 6.0 × 0.50%	**−$10.5m**
HY loss	$150m × 4.0 × 2.00%	**−$12.0m**
Scenario loss, unhedged	4.5% of the fund	**−$22.5m**
Protection on $75m of HY index	$75m × 4.0 × 2.00%	**+$6.0m**
Loss after the hedge	22.5 − 6.0	**$16.5m, 3.3%**

IN THE LESSON

- History is thin on credit crises, so Rosa adds judgement with a scenario.
- Every spread widens by half.
- Investment grade is three hundred and fifty million dollars, spread duration six, and its spread moves fifty basis points.
- The loss is ten point five million.
- High yield is a hundred and fifty million, spread duration four, and its spread moves two hundred basis points.
- The loss is twelve million.
- The total loss is twenty two point five million, four point five per cent, which matches a half widening of the fund's duration times spread.
- Now a hedge.
- Rosa buys protection on seventy five million dollars of a high yield credit default swap index.
- It gains six million.
- The loss falls to sixteen point five million, three point three per cent.
- The hedge softens the blow.

24 Controls for the tail

Marlow's controls for the tail

Control	Works by
Diversify by issuer and sector	Spread it
Position limits	Cap it
Buy CDS protection	Hedge it
Puts on credit ETFs	Insure it

IN THE LESSON

- Measuring the tail is half the job.
- The other half is controlling it, and Rosa has four controls.
- Diversify by issuer and sector, so no single default or industry can sink the fund.
- Set position limits, so no name or tier can grow too large.
- Buy credit default swap protection, as in Example Eight, which pays when spreads blow out.
- Or buy put options on credit exchange traded funds, which work like insurance with a known cost.
- And the trap to avoid: trusting normal distribution value at risk for credit.
- It is too low, as the dollars showed.
- Use conditional value at risk, scenarios and stress tests alongside it.

25 A story: insurance on a neighbour's house

- Buyer pays a premium; seller pays on default
- Seller takes the credit risk, no bond to fund
- Sell protection: synthetic long credit
- Buy protection: synthetic short credit

IN THE LESSON

- Suppose your neighbour insures his house.
- He pays a premium every quarter, and if the house burns down, the insurer pays.
- Now imagine you could also sell that insurance without owning a house at all.
- You collect the premium and take on the risk of the fire.
- A credit default swap works the same way.
- The protection buyer pays a periodic premium and is compensated if the reference entity defaults.
- The protection seller takes on the credit risk without having to buy and fund a bond.
- So selling protection is a synthetic long credit position, and buying protection is a synthetic short.
- Direction is the thing people get wrong, so we will keep it in view.

26 Two outcomes of a credit default swap

If the issuer survives

Buyer pays the premium → Seller keeps collecting → Contract runs to the end

If the issuer defaults

Credit event occurs → Seller pays the loss → Buyer is made whole

IN THE LESSON

- Here are the two paths.
- The top row is what happens if the issuer survives.
- The protection buyer keeps paying the premium.
- The seller keeps collecting it.
- And the contract runs to the end.
- This is the seller's good outcome, much like a bondholder who collects coupons.
- The bottom row is the other path.
- A credit event occurs, such as a default.
- The seller pays the loss, which is the face value less what can be recovered.
- The buyer is compensated and the contract ends.
- Modern contracts use a standard coupon, and an upfront payment settles the difference between that coupon and the market spread.
- Rosa trades with that upfront payment in mind.

27 What a credit default swap is worth

Upfront ≈ (market spread − coupon) × ESD × notional
Seller's gain ≈ −(change in spread) × ESD × notional

Upfront payment	Paid to seller if spread wider
Change in spread	Wider hurts the seller
Effective spread duration	Like bond spread duration
Notional	Face amount of protection

IN THE LESSON

- Two approximations carry most of the weight.
- When the market spread differs from the standard coupon, an upfront payment settles the difference.
- It is roughly the market spread minus the coupon, times effective spread duration, times notional.
- If the market spread is above the coupon, the protection seller receives it.
- After that, the value change for the protection seller is roughly minus the change in spread, times effective spread duration, times notional.
- Read the minus sign carefully.
- When spreads rise, the seller's position loses value.
- When spreads fall, it gains.
- It is the same arithmetic as for a bond with a given spread duration, which is why selling protection behaves like owning the bond.

28 Example 9: selling protection on one name

Sell $20m of 5-year protection; coupon 1.00%; spread 1.60%; ESD 4.4

Upfront received	(1.60% − 1.00%) × 4.4 × $20m	**$528,000**
Coupon, a year	1.00% × $20m	**$200,000**
Spread tightens to 1.30%	+0.30% × 4.4 × $20m	**+$264,000**
Spread widens to 2.10%	−0.50% × 4.4 × $20m	**−$440,000**
Protection buyer, widening	the mirror image	**+$440,000**

IN THE LESSON

- Rosa is positive on Brightwell Foods, a made-up issuer.
- She sells twenty million dollars of five-year protection.
- The standard coupon is one per cent.
- The market spread is one point six per cent and the effective spread duration is four point four.
- The upfront payment is point six per cent times four point four times twenty million, five hundred and twenty eight thousand dollars.
- She receives it from the buyer.
- She also collects the one per cent coupon, two hundred thousand dollars a year.
- If the spread tightens to one point three per cent, she gains point three per cent times four point four times twenty million, two hundred and sixty four thousand.
- If it widens to two point one, she loses four hundred and forty thousand.
- The protection buyer's result is exactly the reverse.

29 Four active uses

How an active manager uses credit default swaps

Use	Example view
Single-name trade	One issuer
Index CDS	Macro or sector
Credit curve trade	Slope
Basis trade	Bond against CDS

IN THE LESSON

- Active managers use credit default swaps in four main ways.
- First, a single name view.
- If Rosa expects one issuer to improve or deteriorate, she sells or buys protection on it, as in Example Nine.
- Second, an index view.
- A credit default swap index gives macro or sector exposure in one cheap, liquid trade, which is how Rosa carries out a top-down tilt.
- Third, a credit curve trade, which bets on the slope between maturities.
- Fourth, a basis trade, which exploits a gap between a bond's spread and the credit default swap spread on the same issuer.
- The next two examples work through the last two.

30 Example 10: a credit curve trade

5y spread 100bp, ESD 4.5; 10y spread 150bp, ESD 8.0. Sell 5y, buy 10y

Equal $10m, parallel +30bp	−135k + 240k	**+$105,000**
Duration-neutral 10y size	$10m × 4.5 ÷ 8.0	**$5.625m**
Neutral, parallel +30bp	−135k + 135k	**$0**
Neutral, 10y alone +20bp	0.20% × 8.0 × $5.625m	**+$90,000**

IN THE LESSON

- Rosa expects the credit curve to steepen.
- Five-year protection trades at one hundred basis points and ten-year at one hundred and fifty.
- She sells five-year protection and buys ten-year protection.
- With equal notional of ten million dollars each, a thirty basis point parallel widening loses a hundred and thirty five thousand dollars on the five-year seller and gains two hundred and forty thousand on the ten-year buyer, a net gain of a hundred and five thousand.
- That is not a curve trade at all, it is a bet that spreads rise.
- To neutralise it, size the ten-year leg by the ratio of spread durations, four point five over eight point oh, which is five point six two five million.
- A parallel move now nets to zero.
- If only the ten-year widens twenty basis points, she gains ninety thousand dollars.
- That is a true curve bet.

31 Example 11: a basis trade

Bond spread 180bp; CDS spread 150bp; buy bond and protection on $10m

Bond spread		**180 bp**
CDS spread		**150 bp**
Basis	CDS − bond = 150 − 180	**−30 bp**
Carry on $10m	0.30% × $10m	**$30,000 a year**
Risks	funding, basis, counterparty	**Not risk-free**

IN THE LESSON

- The last use is the basis trade.
- The basis is the credit default swap spread minus the bond spread for the same issuer.
- Suppose a bond yields a spread of one hundred and eighty basis points, while its credit default swap spread is one hundred and fifty.
- The basis is minus thirty basis points, a negative basis.
- Rosa buys ten million dollars of the bond and buys ten million dollars of protection.
- If the issuer defaults, the bond loss and the protection payout offset.
- She keeps roughly the thirty basis point difference, thirty thousand dollars a year on ten million.
- The trade is not risk free.
- The basis can widen, funding the bond costs money, and the protection seller must be able to pay.

32 Direction, once and for all

Who gains when the spread moves?

Position	Gains when
Sell protection (synthetic long)	Spreads fall
Buy protection (synthetic short)	Spreads rise
Own a bond	Spreads fall
Short a bond	Spreads rise

IN THE LESSON

- Now the trap that catches most candidates: direction.
- Read the table.
- Selling protection is a synthetic long credit position.
- Rosa receives the premium and gains when spreads tighten, just like owning a bond.
- Buying protection is a synthetic short.
- She pays the premium and gains when spreads widen.
- A cash bond owner gains when spreads fall, and a short seller of a bond gains when they rise.
- So the protection buyer gains when spreads widen, and loses when they narrow.
- Before you answer any question on credit default swaps, say to yourself, who is long credit and who is short, and which way did the spread move.

33 Recap: the lesson in four lines

- Size tilts by duration times spread
- Illiquidity: buffer, newer bonds, stress tests
- Tail risk: CVaR, scenarios, diversify, hedge
- CDS: buyers gain when spreads widen

IN THE LESSON

- Let us pull the lesson together.
- First, a top-down credit manager starts with macro views and sizes tilts with duration times spread, because spread duration alone hides the larger spread moves of lower quality.
- Second, illiquidity is a cost and a time, and both multiply in stress, so Rosa holds a buffer, favours larger and newer bonds, uses liquid instruments, and stress tests.
- Third, credit has a fat left tail.
- Conditional value at risk, scenarios, diversification and hedges handle what the normal bell cannot.
- Fourth, credit default swaps let a manager sell or buy credit risk quickly, and the protection buyer gains when spreads widen.

34 Try three quick questions

1. Spread duration 5.0, spread 150bp. Duration times spread? Cost of 20% widening?
   Answer: 5.0 × 150 = 750; 20% of 750 = 150bp, 1.5%.
2. Worst 5 of 100 months: 10, 8, 6, 5, 4%. 95% VaR and CVaR?
   Answer: VaR is the smallest, 4%; CVaR is (10+8+6+5+4) ÷ 5 = 6.6%.
3. Sell $10m protection, ESD 4.0; spread widens 50bp. Result?
   Answer: −0.50% × 4.0 × $10m = −$200,000, a loss.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A tier has spread duration five and a spread of one hundred and fifty basis points.
- What is its duration times spread, and what does a twenty per cent widening cost?
- Five times one hundred and fifty is seven hundred and fifty, and a fifth of that is one hundred and fifty basis points, or one point five per cent.
- Question two.
- The five worst of a hundred months lose ten, eight, six, five and four per cent.
- What are the value at risk and the conditional value at risk?
- The value at risk is the smallest, four per cent, and the average is six point six per cent.
- Question three.
- Rosa sells ten million dollars of protection with effective spread duration four, and the spread widens fifty basis points.
- What happens?
- She loses point five per cent times four times ten million, which is two hundred thousand dollars.
- Well done.