Credit positioning, global credit and analytics

Portfolio Management

1 From a view to a clean position

From view to position

Name the view → Pick the instrument → Size the legs

Then clean up

Hedge rate duration → Check what is left

IN THE LESSON

- Think of a radio.
- You want one station, but there is always some static from the others.
- A credit view is the station, and the other exposures inside a bond are the static.
- Imogen Hale, who runs the Larkspur fund, follows the same routine every time.
- First, name the view exactly: the level of spreads, the shape of one issuer's curve, quality, or one sector against another.
- Second, pick the instrument, which may be bonds, credit default swap indexes or exchange traded funds.
- Third, size the legs so that unwanted exposures cancel.
- Then hedge any interest rate duration that the bonds carry, and check what is left.
- Each step removes one way the trade could go wrong.

2 Which view, which position

Hale's menu of spread views

Her view	The position
Spreads will tighten	Spread duration up
Long end beats short end	Curve trade
Quality will matter more	Shift using DTS
One issuer or sector cheap	Relative value

IN THE LESSON

- Here is the menu, view by view.
- If Hale expects spreads to tighten across the whole market, she raises spread duration, or duration times spread, against the benchmark.
- She can do that with bonds, with credit default swap indexes, or with exchange traded funds.
- If she thinks one issuer's long dated spread will tighten against its short dated spread, she runs a curve trade: long the long end, short the short end, sized to be spread duration neutral.
- If she expects quality to matter more in a downturn, she shifts between investment grade and high yield, sized with D T S.
- For one cheap issuer or sector she uses a relative value trade.
- A view on how jumpy spreads will be uses options on credit default swap indexes.

3 Sizing a curve trade

Short notional = long notional × SD long ÷ SD short
Gain = notional × SD × spread change

Long-leg notional	Sold protection, say
Long-leg spread duration	Longer contract, larger
Short-leg spread duration	Shorter contract, smaller
Short-leg notional	What you buy to balance

IN THE LESSON

- Let us start with the curve trade, because sizing is where most mistakes happen.
- Spread duration measures how much a position's price changes for a small change in its spread.
- A long dated contract has more of it than a short dated one, so equal dollar amounts do not give equal risk.
- To make the trade neutral, take the long leg's notional, multiply by its spread duration, and divide by the short leg's spread duration.
- That gives the notional of the other leg.
- The gain or loss on each leg is its notional times its spread duration times the change in spread, with the sign set by whether you sold or bought protection.
- Selling protection is like owning the bond, and buying protection is like shorting it.

4 Example 1: sizing Hale's curve trade

Sell 10m of 10-year protection (SD 8.0); 5-year SD is 4.5

Long leg	sell 10m of 10-year	**SD 8.0**
Short leg size	10m × 8.0 ÷ 4.5	**17.8m**
Risk units, 10-year leg	10m × 8.0	**80**
Risk units, 5-year leg	17.8m × 4.5	**80**
If 10m on both legs	80 against 45	**35 left over**

IN THE LESSON

- Here is the trade.
- Hale thinks the ten year spread of one issuer will tighten against its five year spread.
- She sells ten million of ten year protection.
- Its spread duration is eight point zero.
- The five year contract has a spread duration of four point five.
- Multiply ten million by eight point zero and divide by four point five, and the answer is seventeen point eight million of five year protection to buy.
- Check the risk.
- The ten year leg carries eighty risk units, the notional times the spread duration, and so does the five year leg.
- Now see the trap.
- Had she traded ten million on both legs, the risks would be eighty against forty five, leaving thirty five of net exposure to the general level of spreads.
- That is a bet on the market, not on the curve.

5 Example 2: what the trade earns

Same trade; 5-year leg unrounded at 17.78m

Spreads widen 30 bp: 10-year leg	0.30% × 8.0 × 10m	**−240,000**
Same move: 5-year leg	0.30% × 4.5 × 17.78m	**+240,000**
Net, level move	−240,000 + 240,000	**0**
10-year tightens 20 bp	0.20% × 8.0 × 10m	**+160,000**

IN THE LESSON

- Now test the trade against two different moves.
- First, every spread on the curve widens by thirty basis points.
- A basis point is a tiny unit of spread.
- Hale sold ten year protection, so she loses: point three per cent times eight point zero times ten million is two hundred forty thousand dollars.
- But she bought the five year protection, which gains the same amount, because the sizing was exact.
- The net is zero.
- The level has been hedged away.
- Now the move she actually expects: the ten year spread tightens by twenty basis points while the five year stays put.
- Her ten year short protection gains point two per cent times eight point zero times ten million, which is one hundred sixty thousand dollars.
- That is the view, and nothing else.

6 A yardstick for quality: DTS

DTS = spread duration × spread (bp)
Loss ≈ DTS × proportional widening

Spread duration	Price sensitivity to spread
Spread in bp	Level of the spread
DTS	Credit risk in one number

IN THE LESSON

- A quality view needs a different yardstick.
- Spread duration alone does not tell the whole story, because a high yield bond's spread is far wider, and it moves by a larger amount when markets change.
- When spreads shift, they tend to move in proportion to their level, so a bond with a much wider spread moves by a much larger amount.
- So managers multiply: duration times spread, called D T S.
- D T S says how sensitive a bond is to a proportional change in spreads.
- For a portfolio, the D T S is the weighted average of the holdings' D T S.
- Compare it with the benchmark's to see whether the fund is taking more or less credit risk.
- The loss from a proportional widening is the D T S times that percentage.

7 Example 3: a recession tilt sized with DTS

IG 6.0 × 120 = 720; HY 4.0 × 480 = 1,920; HY share 30% to 20%

Spread duration, before	0.30×4.0 + 0.70×6.0	**5.40**
Spread duration, after	0.20×4.0 + 0.80×6.0	**5.60**
DTS, before	0.30×1,920 + 0.70×720	**1,080**
DTS, after	0.20×1,920 + 0.80×720	**960**
Loss if spreads widen 10%	DTS × 10% of spread	**1.08% to 0.96%**

IN THE LESSON

- Here is why this matters.
- Hale fears a recession, so she cuts high yield from thirty per cent of the fund to twenty per cent and moves the money into investment grade.
- Look at the first two rows.
- Spread duration goes up, from five point four to five point six, because the high yield bonds are shorter.
- A trustee reading only that number would say she added credit risk.
- Now use D T S.
- The investment grade bond has six point zero times one hundred twenty, which is seven hundred twenty.
- The high yield bond has four point zero times four hundred eighty, which is one thousand nine hundred twenty.
- The fund falls from one thousand eighty to nine hundred sixty.
- If spreads widen by ten per cent in proportion, the loss falls from one point zero eight per cent to point nine six.
- D T S got the direction right.

8 DTS: bond by bond, fund before and after

DTS (spread duration × bp)

IG bond	**720**
HY bond	**1,920**
Fund before	**1,080**
Fund after	**960**

Fund DTS down 11%

IN THE LESSON

- Here are the same figures as bars.
- The vertical axis is D T S, spread duration times spread.
- The first bar is the investment grade bond, seven hundred twenty.
- The second is the high yield bond, one thousand nine hundred twenty, far higher even though its duration is shorter.
- The reason is the spread, which is far wider.
- The third bar is the whole fund before the trade, one thousand eighty.
- The fourth is the fund after, nine hundred sixty.
- The fund's credit risk has fallen by about eleven per cent, even though its spread duration rose.
- That is the difference between the two yardsticks, and for a quality view D T S is the one to trust.

9 Example 4: keep rates out of a spread trade

Buy 10m corporate bond, rate duration 6.0; futures duration 8.0

Rates up 50 bp: bond loses	10m × 6.0 × 0.50%	**−300,000**
Futures to sell	10m × 6.0 ÷ 8.0	**7.5m**
Futures gain on the same rise	7.5m × 8.0 × 0.50%	**+300,000**
Net effect of rates	−300,000 + 300,000	**0**
What is left	the spread view only	**clean**

IN THE LESSON

- Last, keep rates out.
- A corporate bond carries two risks in one: its spread and the government yield underneath.
- Suppose Hale buys a bond for ten million because she expects its spread to tighten.
- Its rate duration is six point zero.
- If government yields rise by fifty basis points, the bond loses ten million times six point zero times half a per cent, three hundred thousand dollars, and that could cancel her spread gain.
- So she sells government bond futures with a duration of eight point zero.
- Ten million times six point zero over eight point zero is seven point five million.
- If rates rise, the futures gain three hundred thousand, and rates net out.
- What remains is the spread view.
- Credit default swaps carry little rate exposure, which is one reason managers use them for pure spread views.

10 A story: the bond that looks cheap abroad

- Same rating, wider spread abroad: bargain or bill?
- Currency exposure, hedging cost and the basis
- Bankruptcy law and creditor rights set recovery
- Disclosure, accounting and sector mix differ
- Emerging markets: sovereign risk, controls, state support

IN THE LESSON

- Imagine two bakeries with the same hygiene rating.
- One sits across the border and sells at a lower price.
- A bargain?
- Perhaps.
- Or perhaps the law there makes it harder to get your money back if it closes.
- Foreign bonds are the same.
- A global credit portfolio adds dimensions beyond the issuer.
- There is currency, and the cost of hedging it.
- There are different bankruptcy laws and creditor rights, which change recovery.
- Disclosure and accounting standards differ, so the same ratio means different things.
- And each market has its own sector mix.
- Emerging markets add more: sovereign and political risk, dependence on commodities, capital controls, thin trading, and issuers owned by the state, who may or may not be rescued.
- A wider spread abroad may simply be the bill for all of these.

11 What changes when credit crosses borders

Checklist for a foreign bond

Dimension	What it changes
Currency and hedging	Yield after cost
Bankruptcy and creditor rights	Recovery
Disclosure and accounting	Data you can trust
Sector mix	Hidden exposure

IN THE LESSON

- Here is a checklist for any foreign bond.
- Currency comes first.
- A local currency bond gives the investor currency risk, and hedging it has a cost.
- Next is the legal system.
- Bankruptcy regimes and creditor rights decide how much you get back after a default, so two bonds with the same rating can have very different recovery.
- Then disclosure and accounting.
- If standards differ, the ratios you rely on may not mean what you think.
- Finally, sector mix.
- A foreign market may be heavy in banks or in commodity producers, so buying it quietly changes the fund's sector exposure, not only its country exposure.

12 Example 5: is the wider spread cheap?

Foreign BB spread 3.60%, home BB 3.00%; default chance 2.0%

Pickup abroad	3.60% − 3.00%	**0.60%**
Home expected loss	2.0% × (1 − 45%)	**1.10%**
Foreign expected loss	2.0% × (1 − 25%)	**1.50%**
Thinner trading allowance	wider bid-ask	**0.25%**
Net pickup	0.60 − 0.40 − 0.25	**−0.05%**

IN THE LESSON

- Now test the idea with numbers.
- Tomas Reyes compares two bonds with the same rating and the same chance of default, two per cent a year.
- The foreign one pays three point six per cent over the benchmark, the home one three per cent.
- That is a pickup of point six per cent.
- Expected loss is the chance of default times what is lost, which is one minus the recovery rate.
- At home, recovery is forty five per cent, so the expected loss is one point one per cent.
- Abroad, creditors recover only twenty five per cent, so the expected loss is one point five.
- The extra loss is point four.
- Add point two five per cent for thinner trading.
- Point six, less point four, less point two five, leaves a small negative.
- The bargain was an illusion.

13 Where the extra spread goes

Percent a year

Extra spread	**0.60**
Weaker recovery	**0.40**
Thinner trading	**0.25**

Net pickup: 0.60 − 0.40 − 0.25 = −0.05

IN THE LESSON

- Here is where that extra spread went.
- The vertical axis is percent a year.
- The first bar is the pickup, point six.
- It is what the screen shows, and it is what tempts a manager.
- The second bar is weaker recovery, worth point four, which is the extra expected loss from the weaker bankruptcy regime.
- The third is thinner trading, point two five.
- Add the second and third together and they come to more than the pickup.
- Net, the foreign bond pays slightly less than the home bond for the risks it carries.
- The wider spread was not a gift.
- It was the price of those risks, and emerging markets would add further layers this chart does not show.

14 Comparing hedged yields

Hedged yield = local yield + (home rate − local rate) − basis

Local-currency yield	Headline yield
Home minus local rate	Usually negative
Cross-currency basis cost	Extra swap-market charge
Hedged yield	Yield in your own currency

IN THE LESSON

- Now currency.
- A bond in a local currency gives the investor currency risk.
- A bond in a hard currency, such as dollars, moves the mismatch onto the issuer: if it earns in its home currency and that currency falls, its dollar debt gets heavier and default becomes more likely.
- To compare fairly, hedge the local bond back to the investor's currency.
- The hedged yield is the local yield, plus the home short rate minus the local short rate, less the cross currency basis cost.
- The rate gap is negative when local rates are higher, so the hedge takes away much of the headline yield.
- The basis is an extra charge in the swap market that can move with demand for the home currency.

15 Example 6: Solvara Power, hedged

Solvara 5-year, local bond 8.90%; dollar rate 3.00%, sol rate 7.40%

Local-currency yield	sol bond	**8.90%**
Rate gap, home minus local	3.00 − 7.40	**−4.40%**
Cross-currency basis cost	swap-market charge	**−0.35%**
Hedged yield	8.90 − 4.40 − 0.35	**4.15%**
Solvara's dollar bond	issuer bears mismatch	**4.80%**

IN THE LESSON

- Reyes spots a five year bond from Solvara Power in its local currency, the sol, yielding eight point nine per cent.
- It looks far richer than dollar bonds.
- So he hedges it.
- The dollar short rate is three per cent and the sol rate is seven point four, so the rate gap costs four point four.
- The basis is a further point three five.
- Hedged yield: eight point nine, less four point four, less point three five, equals four point one five per cent.
- Solvara's own dollar bond yields four point eight.
- That is more, but it is not free, because the issuer earns in sols, and a falling sol raises its default risk.
- Neither bond is a bargain.
- They are different risks, and the headline pickup was mostly the hedge cost in disguise.

16 Common mistakes so far

- Curve trade with equal notionals leaves a bet on the level
- Comparing quality with spread duration instead of DTS
- Hedging the spread but not government yield exposure
- Calling a wider foreign spread cheap before recovery cost
- Comparing local yields without hedging cost and basis

IN THE LESSON

- Before we move on, here are the mistakes that cost managers money in what we have covered so far.
- First, running a curve trade with equal notionals, which leaves a bet on the level of spreads.
- Second, using spread duration alone to compare quality, when D T S is the right yardstick.
- Third, hedging the spread but leaving government yield exposure, so the trade becomes a bet on rates.
- Fourth, calling a wider foreign spread cheap before subtracting the cost of weaker recovery and thinner trading.
- Fifth, comparing local currency yields without the hedging cost and the basis.
- Each one is a case of reading a headline number without asking what sits underneath it.

17 A story: the flooding block of flats

- Loans pooled, then sliced into tranches
- Equity and mezzanine take losses first and pay more
- Senior is hit last: high rating, lower yield
- Slicing moves risk around; the pool's total risk stays

IN THE LESSON

- Picture a block of flats on a river.
- If a flood comes, the ground floor goes under first, then the middle floor, and the top floor stays dry unless the water rises very high.
- A securitisation works like that.
- A pool of loans, such as mortgages, car loans or leveraged loans, is sliced into tranches.
- Defaults flood the bottom slice first.
- The equity tranche takes the first losses and pays the highest yield.
- The mezzanine tranche sits above it.
- The senior tranche is last to be hit, so it earns a high rating and a low yield.
- The slicing does not remove risk from the pool.
- It only decides who bears it, and in what order.

18 Who loses first

Illustrative pool of 100m; losses fill from the bottom

Tranche	Starts losing at
Equity, first 8m	0%
Mezzanine, next 12m	8%
Senior, last 80m	20%

IN THE LESSON

- Let us put numbers on the building.
- Take an illustrative pool of one hundred million.
- The equity tranche is the first eight million, and it starts losing from the very first dollar of pool losses.
- The mezzanine tranche is the next twelve million.
- It is untouched until the pool has lost eight per cent, and then it begins to absorb losses.
- The senior tranche is the last eighty million.
- It loses nothing until pool losses pass twenty per cent.
- These start points are called attachment points.
- The size of each slice is its width.
- A senior tranche with a high rating is safe only as long as the pool does not lose more than twenty per cent.

19 Loss on a tranche

Tranche loss = (pool loss − attachment) ÷ width, kept between 0% and 100%

Pool loss	Share of the pool lost
Attachment point	Where the tranche starts
Tranche width	Size of the slice
Tranche loss	Share of the tranche lost

IN THE LESSON

- The loss on a tranche follows a simple rule.
- Take the pool loss and subtract the tranche's attachment point.
- If the answer is zero or less, the tranche loses nothing.
- Otherwise, divide by the tranche's width to get the share of the tranche that is lost, and stop at one hundred per cent.
- Everything is measured as a percentage of the whole pool, so the equity tranche, which attaches at zero, takes the first losses.
- Notice that the formula needs only the pool loss, and says nothing about why the loss happened.
- That is the weak point, and we will see it in the next example, where the pool loss is not the same in every year.

20 Example 7: two pool losses

100m pool; equity 0 to 8, mezzanine 8 to 20, senior above 20

Pool loses 6%: equity	6 ÷ 8	**75%**
Pool loses 6%: the others	below 8 and 20	**0%**
Pool loses 22%: equity	22 is above 8	**100%**
Pool loses 22%: mezzanine	14 above 12	**100%**
Pool loses 22%: senior	(22 − 20) ÷ 80	**2.5%**

IN THE LESSON

- Apply the rule to two pool losses.
- Suppose the pool loses six per cent.
- The equity tranche loses six out of eight, which is seventy five per cent of its value.
- The mezzanine and senior tranches lose nothing, because six is below eight and below twenty.
- Now suppose a bad year, and the pool loses twenty two per cent.
- Equity is wiped out.
- The mezzanine tranche is wiped out too, because fourteen points of loss land on a slice twelve wide.
- And the senior tranche loses twenty two less twenty, divided by eighty, which is two point five per cent of its value.
- A tranche rated as very safe has just lost money.
- The rule shows how quickly the loss climbs once the pool gets into trouble.

21 Example 8: same average loss, different tranches

High correlation: 80% chance of 2% loss, 20% chance of 22%

Pool expected loss, either world	0.8×2 + 0.2×22	**6.0%**
Senior, high correlation	0.2 × 2.5%	**0.5%**
Mezzanine, high correlation	0.2 × 100%	**20%**
Equity, high correlation	0.8×25% + 0.2×100%	**40%**
Equity, low correlation	6 ÷ 8 every year	**75%**

IN THE LESSON

- Now the real lesson.
- A rating looks at the pool's expected loss, which is six per cent in both worlds we will compare.
- In the first, defaults are scattered and the pool loses about six per cent every year.
- In the second, defaults arrive together: eighty per cent of the time the loss is only two per cent, and twenty per cent of the time it is twenty two.
- The average is still six.
- Now the tranches.
- The senior tranche loses two point five per cent in the bad year, so its expected loss is point five per cent, against nothing before.
- The mezzanine is wiped out in the bad year, so its expected loss is twenty per cent.
- Equity, oddly, does better as correlation rises: forty per cent, against seventy five.
- The rating on the senior tranche hid all of this.

22 Expected loss by tranche when defaults cluster

Expected loss, % of tranche

Senior	**0.5**
Mezzanine	**20**
Equity	**40**

Low correlation: senior 0, mezzanine 0, equity 75

IN THE LESSON

- Here are those expected losses as bars.
- The vertical axis is the expected loss as a percentage of each tranche's value, in the world where defaults arrive together.
- The first bar is the senior tranche, only point five per cent.
- It is small, but it was zero when defaults were scattered, and it is a loss on a tranche that carried the highest rating.
- The second bar is the mezzanine, twenty per cent, up from nothing.
- The third is equity, forty per cent, which is actually down from seventy five.
- The lesson is that the same pool, with the same average loss, can treat its tranches very differently, depending on how closely the defaults are linked.
- Never judge a tranche by the rating alone.

23 Structured products as bond substitutes

What each substitute brings

Substitute	Main feature
Mortgage-backed (MBS)	Short volatility
Asset-backed (ABS)	Other borrowers
Loan obligation (CLO)	Floating rate
Covered bond	Dual recourse

IN THE LESSON

- Now let us meet the products themselves.
- Mortgage backed securities give exposure to home loans, but the borrowers can prepay.
- That brings prepayment risk and negative convexity, which makes the holder effectively short volatility.
- Asset backed securities give credit exposure to other borrowers, such as car or card loans, which corporate indexes barely reach, so they add diversification.
- Collateralised loan obligations pass on the cash flows of leveraged loans, which pay floating rates.
- Covered bonds keep the assets on the issuer's balance sheet, and give the investor recourse to both the issuer and the pool of assets.
- Each can stand in for a corporate bond, but each has its own risk to understand first.

24 What goes in and what comes out

What goes in

Positions and cash flows → Prices and curves → Prepayment and volatility

What comes out

Durations and DTS → Tracking error → Scenario profit and loss

IN THE LESSON

- Think of an aircraft cockpit.
- The instruments give the pilot a lot of numbers in a glance, but each one depends on a sensor, and sensors can be wrong.
- A fixed income analytics system is the same.
- On the way in, it takes each position's terms and cash flows, market prices, and the yield and spread curves.
- For bonds with options inside, especially mortgage backed securities, it also needs assumptions about prepayment and about interest rate volatility.
- On the way out, it gives durations, convexity, spread duration and D T S, tracking error against the benchmark, and the profit or loss under scenarios.
- Managers use it to test a strategy before trading, and to watch the risk afterwards.

25 Outputs and what they tell you

Main outputs of a portfolio analytics system

Output	Tells you
Key rate durations	Where on the curve
Spread duration and DTS	Credit sensitivity
Tracking error	Gap to benchmark
Scenario profit and loss	Cost of a shock

IN THE LESSON

- Let us look at the outputs one at a time.
- Effective duration measures the sensitivity to a shift in yields, and it works for bonds with options because it lets the cash flows change.
- Key rate durations split that sensitivity along the curve, showing where the bets sit.
- Spread duration and D T S show the sensitivity to credit spreads.
- Tracking error, the standard deviation of the return gap against the benchmark, shows how much active risk the fund is running.
- Scenario profit and loss shows what a defined shock would cost.
- The system also splits expected return into parts such as carry and roll.
- A good manager reads these together, not one by one.

26 Portfolio duration and active duration

Portfolio duration = Σ weight × duration
Relative return ≈ − active duration × change in yield

Weight	Share of the fund
Duration	From the model
Active duration	Portfolio minus benchmark
Change in yield	The rate move

IN THE LESSON

- Two calculations sit under many of these screens.
- The first is portfolio duration, which is the weighted average of the holdings' durations.
- The second is active duration, the portfolio's duration less the benchmark's.
- To a first approximation, the return relative to the benchmark is minus the active duration times the change in yield.
- If the fund is longer than the benchmark and yields fall, it gains.
- If it is shorter and yields fall, it lags.
- The same logic works for each point on the curve, with a key rate duration in place of the single duration.
- The catch is that the durations used are themselves model outputs, and for some bonds they depend heavily on assumptions the system has to make.

27 Example 9: one assumption, two answers

70% bonds, duration 6.5; 30% MBS; benchmark duration 6.0

Non-MBS contribution	70% × 6.5	**4.55**
Base case duration	4.55 + 30% × 4.0	**5.75**
Slower prepayments duration	4.55 + 30% × 6.0	**6.35**
Rates up 50 bp, base case	(6.0 − 5.75) × 0.50%	**+0.125%**
Rates up 50 bp, slower	(6.0 − 6.35) × 0.50%	**−0.175%**

IN THE LESSON

- Here is how one assumption changes the answer.
- Hale's fund holds seventy per cent in bonds with an effective duration of six point five, and thirty per cent in mortgage backed securities.
- The benchmark's duration is six point zero.
- The non mortgage part contributes four point five five.
- Under the base prepayment assumption the system gives the mortgage securities a duration of four point zero, so the fund is five point seven five, just short of the benchmark.
- But if prepayments slow as rates rise, the system gives six point zero, and the fund becomes six point three five, longer than the benchmark.
- If rates rise by fifty basis points, the fund beats the benchmark in one case and lags it in the other.

28 Same holdings, different duration

Duration (years)

Benchmark	**6.0**
Base case	**5.75**
Slower prepayments	**6.35**

Same holdings, one assumption changed

IN THE LESSON

- Here is the same example as bars.
- The vertical axis is duration in years.
- The first bar is the benchmark, six point zero.
- The second is the fund under the base prepayment assumption, five point seven five, a little short.
- The third is the fund if prepayments slow, six point three five, a little long.
- The holdings did not change between the second and third bars.
- Only an assumption did.
- When markets are stressed, those assumptions are hardest to verify, because there is little recent behaviour to learn from.
- So a manager should run the numbers under several prepayment views and look at the range, not the single number on the screen.

29 Example 10: a hidden curve bet

Active key rate durations: 2-year −0.5, 10-year +0.5

Net active duration	−0.5 + 0.5	**0.0**
Parallel rise, 50 bp	−(−0.5 + 0.5) × 0.50%	**0.00%**
2-year up 30 bp, 10-year flat	−(−0.5) × 0.30%	**+0.15%**
What the single number said	neutral	**no bet**
What the key rates show	flattening bet	**+0.15%**

IN THE LESSON

- Key rate durations reveal what a single duration hides.
- Suppose Hale's fund has an active key rate duration of minus point five at two years and plus point five at ten years, compared with the benchmark.
- Added together, the net active duration is zero, so a single number would call the fund neutral.
- If yields rise by fifty basis points in parallel, the two bets cancel and the relative return is zero.
- But if the two year yield rises by thirty basis points while the ten year does not move, the fund gains point one five per cent, because it was underweight the front end.
- The fund was never neutral.
- It was making a curve bet, and the key rate view shows it.

30 Cautions: estimates, not facts

- Outputs rest on assumptions: prepayments, rate volatility
- Stressed markets: assumptions are hardest to check
- Stale or evaluated prices for illiquid bonds hide risk
- Past correlations can break down when they matter most
- Treat outputs as estimates to question, not facts

IN THE LESSON

- A pilot who trusts a faulty sensor can fly into trouble, and a manager who trusts the screen can do the same.
- There are several cautions.
- First, outputs depend on model assumptions, such as prepayment behaviour and rate volatility, which are hardest to verify when markets are stressed.
- Second, prices for illiquid bonds are often stale or evaluated rather than traded, which can understate their risk.
- Third, historical correlations used for tracking error and scenarios can break down just when they matter most.
- The trap is to treat model outputs as facts.
- They are estimates, and the sound habit is to question the assumptions, test alternatives and keep a margin for error.

31 Recap: the lesson in five lines

- Isolate the view: size with SD or DTS, hedge rates
- Foreign spread: net of recovery, liquidity and hedging cost
- Tranche risk depends on default correlation, not rating
- Analytics: durations, DTS, tracking error, scenarios
- Outputs are estimates resting on assumptions

IN THE LESSON

- Let us pull the lesson together.
- First, a spread view should be expressed so that it holds the view and nothing else: level views change spread duration or D T S, curve views are sized to be spread duration neutral, quality views use D T S, and rate duration is hedged away.
- Second, a wider spread abroad may pay for weaker recovery, thinner trading and hedging cost, so subtract those before calling it cheap.
- Third, structured products stand in for corporate bonds, but a tranche depends on default correlation, not just its rating.
- Fourth, analytics give durations, spreads, tracking error and scenarios.
- Fifth, they are estimates that rest on assumptions.

32 Try three quick questions

1. Sell 12m of 10-year (SD 7.5); 3-year SD 2.5. Buy how much?
   Answer: 12 × 7.5 ÷ 2.5 = 36m of 3-year protection.
2. Tranche attaches at 5%, width 10%. Pool loses 9%. Tranche loss?
   Answer: (9 − 5) ÷ 10 = 40%.
3. 60% bonds (duration 5.0), 40% MBS (3.0); benchmark 4.5. If MBS goes to 5.0?
   Answer: Now 3.0 + 1.2 = 4.2, short; after: 3.0 + 2.0 = 5.0, long.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A manager sells twelve million of ten year protection with a spread duration of seven point five, and buys three year protection with a spread duration of two point five.
- How much should she buy to be spread duration neutral?
- Twelve times seven point five, divided by two point five, gives thirty six million.
- Question two.
- A tranche attaches at five per cent and is ten wide.
- The pool loses nine per cent.
- How much of the tranche is lost?
- Nine less five is four, divided by ten, so forty per cent.
- Question three.
- A fund holds sixty per cent in bonds with a duration of five and forty per cent in mortgage securities with a duration of three.
- The benchmark is four point five.
- What is the fund's duration, and what if the mortgage duration extends to five?
- Three plus one point two is four point two, short of the benchmark, but five point zero if it extends, which is longer.