Swap curves, spreads and term structure theories

Fixed income

1 A story: which ruler do you measure with?

- A spread is a gap above a starting line
- Starting line one: the government curve
- Starting line two: the swap curve
- Always say which line you measured from

IN THE LESSON

- Picture two builders measuring the same plank.
- One uses a ruler from the government office, which is very accurate but only has marks at a few lengths.
- The other uses a ruler from the trade association, which has marks at every length and is the one everyone on the building site actually uses.
- Both can measure the plank, but they give different numbers, and you must always say which ruler you used.
- Bond spreads are just like that.
- A spread is a gap, and a gap needs a starting line.
- The starting line can be the government curve or the swap curve, and that choice changes the answer.

2 What the swap rate curve is

- Swap: pay fixed, receive floating, or the reverse
- The fixed rate is set so the deal starts at zero value
- That fixed rate is the swap rate
- Swap rates across maturities form the curve

IN THE LESSON

- First, what is a swap?
- In a plain interest rate swap, one side agrees to pay a fixed rate, and the other side agrees to pay a floating rate, which is a short-term reference rate that resets every period.
- No loan is made, only the interest payments change hands.
- The fixed rate is chosen so that the swap is worth nothing on the day it starts.
- That fixed rate is called the swap rate, and every maturity has its own.
- A two year swap has one rate, a five year swap another, a ten year swap another.
- Line those rates up by maturity, and you have the swap rate curve.

3 Building the swap rate curve

One par swap

Pay the fixed rate → Receive the floating rate → Starts at zero value

Repeat for each maturity

Two-year rate → Five-year rate → Ten-year rate → Plot: the swap curve

IN THE LESSON

- Here is how the curve is built, in the order the boxes are drawn.
- On the top row is one swap.
- One side pays the fixed rate.
- The other side pays the floating rate.
- And the fixed rate is set so that the deal is worth nothing at the start, which is why it is called a par swap.
- On the bottom row we repeat that for every maturity.
- The dealers quote a two year swap rate, a five year swap rate, a ten year swap rate and so on.
- Plot them against maturity, and you have the swap curve, which sits beside the government curve as a second picture of interest rates.

4 Why use swaps instead of government bonds?

- Deep, liquid market with many maturities
- Not distorted by government issuance or scarcity
- Reflects bank credit risk, like their own funding
- Government yield: nearly free of default risk

IN THE LESSON

- Why would anyone prefer the swap curve?
- There are three reasons.
- One, the swap market is deep and liquid and quotes a rate at many maturities, while the government may issue bonds only at a few maturities.
- Two, the swap curve is not distorted by the government's own behaviour.
- If the government issues a huge amount of debt, or a particular bond becomes scarce and everyone wants it, government yields move for reasons that have nothing to do with the economy.
- Swap rates are free of that.
- Three, the swap rate reflects the credit risk of the banks that fund themselves at floating rates, and that is exactly the risk many banks and corporate treasurers face themselves.

5 Which curve answers which question?

Government curve against swap curve

Question	Better guide
Many liquid maturities?	Swap
Free of government supply effects?	Swap
Shows bank credit risk?	Swap
Nearest to a risk-free rate?	Government

IN THE LESSON

- Let's put the comparison in a small table.
- Many liquid maturities?
- The swap curve wins, because there is a quoted rate at each tenor.
- Free of government supply effects?
- Again the swap curve, since it does not depend on how much debt the government issues.
- Shows bank credit risk?
- The swap curve, because the floating rate it is built on carries bank credit risk.
- But if you want the nearest thing to a risk free rate, the government curve is still the better guide.
- The swap rate is not risk free.
- So neither curve is better in every way.
- They answer different questions, and that is why a professional looks at both.

6 Two ways to quote a bond's spread

I-spread = bond yield − swap rate
G-spread = bond yield − government yield

Bond yield	What the bond pays
Swap rate, same maturity	Match the maturity
Government yield, same maturity	Match the maturity
I-spread	Premium over the swap curve
G-spread	Premium over the government

IN THE LESSON

- Now the two spreads.
- Suppose an analyst, Mei Tanaka at a made-up firm called Orchard Bay Capital, is looking at a corporate bond.
- The I-spread is the bond's yield minus the swap rate for the same maturity.
- The G-spread is the bond's yield minus the government yield for the same maturity.
- Both are in percentage points, or basis points, where a basis point is one hundredth of one percentage point.
- The letters are only labels, I for the interpolated swap curve and G for government.
- The thing to remember is the match.
- Always the same maturity, and always subtract the benchmark from the bond yield, never the other way round.

7 Example 1: one bond, two spreads

Five-year bond 4.65%; swap 3.55%; government 3.15%

G-spread	4.65 − 3.15	**1.50%**
I-spread	4.65 − 3.55	**1.10%**
Gap between them	1.50 − 1.10	**0.40%**
Swap rate minus government	3.55 − 3.15	**0.40%**

IN THE LESSON

- Example one.
- Tanaka looks at a five year corporate bond yielding four point six five per cent.
- The five year swap rate is three point five five, and the five year government yield is three point one five.
- The G-spread is four point six five minus three point one five, which is one point five zero, or one hundred and fifty basis points.
- The I-spread is four point six five minus three point five five, which is one point one zero, or one hundred and ten basis points.
- The two differ by forty basis points.
- Where does that forty come from?
- It is the swap rate minus the government yield, and that has a name of its own, the swap spread, which is our next topic.

8 Example 2: a treasurer turns fixed into floating

Issue fixed at 4.65%, then swap to floating

Pay on the bond	fixed coupon	**4.65%**
Receive on the swap	five-year swap rate	**3.55%**
Pay on the swap	floating reference rate	**floating**
Net cost	4.65 − 3.55 = 1.10	**floating + 1.10%**

The G-spread of 1.50 is not a cost the company pays

IN THE LESSON

- Example two shows why treasurers like the I-spread.
- A company wants floating rate funding.
- It issues that same five year bond at a fixed four point six five per cent.
- At the same time it enters a swap in which it receives the fixed swap rate of three point five five and pays the floating reference rate.
- The fixed amounts nearly cancel.
- The company pays four point six five on the bond and receives three point five five on the swap, a net of one point one zero.
- So its all in cost is the floating reference rate plus one point one zero per cent.
- That is the I-spread, and it can be compared directly with a floating rate bank loan.

9 The swap spread

Swap spread = swap rate − government yield (same maturity)

Swap rate, same maturity	Fixed rate on the swap
Government yield, same maturity	Government bond yield
Swap spread	Positive in the usual case

IN THE LESSON

- Now the swap spread, which compares the two curves directly.
- The swap spread for a maturity is the swap rate minus the government bond yield of the same maturity.
- With a five year swap rate of three point five five per cent and a five year government yield of three point one five, the swap spread is forty basis points.
- Think of it as the extra that the banking system pays over the government, for carrying more credit risk and less liquidity, plus the effects of supply and demand in each market.
- Watch the direction.
- The swap spread is the swap rate minus the government yield, not the other way round, and both must be the same maturity.

10 Example 3: swap spreads across maturities

Swap rate minus government yield, same maturity

Two years	3.70 − 3.40	**30 bp**
Five years	3.55 − 3.15	**40 bp**
Ten years	3.65 − 3.45	**20 bp**
Thirty years	3.60 − 3.75	**−15 bp**

Illustrative rates; bp = basis points

IN THE LESSON

- Example three.
- Tanaka collects swap rates and government yields at four maturities, all made up.
- At two years, the swap rate is three point seven zero and the government yield is three point four zero, so the swap spread is thirty basis points.
- At five years, three point five five minus three point one five gives forty.
- At ten years, three point six five minus three point four five gives twenty.
- At thirty years, the swap rate is three point six zero and the government yield is three point seven five.
- Three point six minus three point seven five is minus fifteen basis points.
- The swap spread has turned negative.
- That is unusual, so let us draw the picture and see.

11 The two curves drawn together

Chart: Yield (%) vs Maturity (short to long)

- Swap curve
- Government curve
- Spread +40 bp
- Spread −15 bp

IN THE LESSON

- Here is the picture.
- Maturity runs along the bottom, from short on the left to thirty years on the right, and the yield is up the side.
- The blue line is the swap curve and the gold line is the government curve.
- Follow them from the left.
- At two, five and ten years, the swap curve sits above the government curve, so the swap spread is positive, and the red line at five years shows the forty basis points.
- Now look at the far right.
- At thirty years the lines have crossed.
- The government yield is now above the swap rate, so the spread is negative, minus fifteen basis points.
- Same market, but the sign has flipped at the long end.

12 What a swap spread is telling you

- Usual sign: positive, extra bank credit and liquidity risk
- Widening: more bank risk, or scarcer government bonds
- Negative: heavy bond supply, stretched dealers
- Never read it as banks safer than the state

IN THE LESSON

- So how do we read a swap spread?
- Usually it is positive, because a swap carries bank credit and liquidity risk that a government bond does not.
- So when the spread widens, one common reason is that investors see more risk in the banks, and want more over the government.
- Another reason is that government bonds have become scarce or are in very high demand, which pushes their yields down.
- Now the negative case.
- A negative spread does not mean banks have become safer than the government.
- It can happen when the government issues a heavy supply of long bonds and dealers, whose balance sheets are full, cannot absorb them.
- The spread is a price set in two markets, and either can move it.

13 Example 4: a change in the spread, and two slips

Five-year swap and five-year government, two dates

Spread last month	3.55 − 3.15	**40 bp**
Spread today	3.70 − 3.05	**65 bp**
Change	65 − 40	**wider by 25 bp**
Wrong way round	3.05 − 3.70	**−65 bp**
Mixed maturities	3.70 − 3.45, ten-year gov	**25 bp**

IN THE LESSON

- Example four.
- Last month the five year swap rate was three point five five and the five year government yield three point one five, a spread of forty basis points.
- Today the swap rate is three point seven zero and the government yield is three point zero five, so the spread is sixty five.
- It has widened by twenty five basis points, with swap rates rising and government yields falling, which fits rising bank risk alongside a move into government bonds.
- Now two junior mistakes.
- Subtract the wrong way round, and you get minus sixty five.
- Pair the five year swap with a ten year government yield of three point four five, and you get twenty five.
- Neither is the true spread.

14 Four mistakes to avoid so far

- I-spread uses swaps; G-spread uses government yields
- Swap spread = swap − government, never reversed
- Match the maturities before you subtract
- A negative spread is not proof that banks are safer

IN THE LESSON

- Before we move on, here are the slips that cost marks.
- One.
- Mixing up the two spreads.
- The I-spread is measured from the swap curve and the G-spread from the government curve, and the I-spread is smaller whenever the swap spread is positive.
- Two.
- Subtracting the wrong way.
- The swap spread is the swap rate minus the government yield.
- Three.
- Mixing maturities.
- Always compare a swap and a bond of the same maturity, or the slope of the curve sneaks into your answer.
- Four.
- Reading a negative swap spread as banks being safer than the government.
- It usually points to supply and balance sheet effects in the bond market.

15 A story: the banks' fever chart

- Banks lend to each other unsecured, short term
- Nervous lenders charge more
- Compare with a rate that has almost no bank risk
- The gap is a stress thermometer

IN THE LESSON

- When a person is ill, a doctor takes a temperature.
- When banks start to doubt one another, there is a similar reading, and it shows up first in the rate on short-term lending between banks, with no collateral behind it.
- If a bank is sure its neighbour will repay, it lends cheaply.
- If it is nervous, it charges more.
- Compare that rate with a rate that carries almost no risk, such as a government bill, and the gap is the thermometer.
- A wide gap means lenders want extra pay for bank credit risk and for tying up their cash.
- A narrow gap means calm.
- These gaps are called short-term rate spreads.

16 Libor, the TED spread and the overnight indexed swap

- TED: three-month Libor minus bill yield
- OIS tracks the expected overnight policy rate
- Spread over OIS strips out policy expectations
- Libor is gone; use a published unsecured rate

IN THE LESSON

- Here are the classic gauges.
- The TED spread is the three month Libor rate minus the three month government bill yield.
- Libor was the rate at which banks said they could borrow from each other.
- The second gauge is the Libor minus overnight indexed swap spread.
- An overnight indexed swap exchanges a fixed rate for the compounded overnight rate, so its rate tracks the central bank's expected path of overnight rates, with almost no credit risk.
- Subtracting it removes expectations about policy, and leaves mostly bank risk.
- Libor has now been discontinued, so the same idea is used with rates that are still published, such as an unsecured bank rate or the secured overnight financing rate.

17 The two short-term gauges

Credit gauge = unsecured bank rate − OIS rate
TED-style gauge = unsecured bank rate − bill yield

Unsecured bank rate	Bank credit and liquidity risk
Overnight indexed swap rate	Tracks expected policy rate
Government bill yield	Almost no credit risk

IN THE LESSON

- Let's write the two gauges in their modern form.
- The credit gauge equals the unsecured bank rate, minus the overnight indexed swap rate of the same maturity.
- The unsecured bank rate carries bank credit and liquidity risk.
- The overnight indexed swap rate carries expected policy rates and little else.
- So with policy expectations steady, the gap isolates bank risk.
- The second gauge, in the style of the TED spread, subtracts a government bill yield instead.
- It moves too when investors rush to buy bills, because that pushes bill yields down.
- So that gauge picks up both bank stress and the flight to safety.
- In all of them, a wider spread means more stress.

18 Example 5: calm month, then a stressed month

Three-month rates, policy expectations unchanged

Spread over OIS, calm	4.45 − 4.30	**15 bp**
Spread over OIS, stress	5.10 − 4.30	**80 bp**
Bill spread, calm	4.45 − 4.20	**25 bp**
Bill spread, stress	5.10 − 3.90	**120 bp**
Bill spread rose by more	95 − 65 = 30	**bills rallied**

IN THE LESSON

- Example five.
- In a calm month, the three month unsecured bank rate is four point four five per cent, the overnight indexed swap rate is four point three zero, and the government bill yields four point two zero.
- The spread over the overnight indexed swap rate is fifteen basis points.
- The bill based spread is twenty five.
- A month later, policy expectations are unchanged, so the swap rate stays at four point three zero, but the unsecured rate has jumped to five point one zero and the bill yield has fallen to three point nine zero.
- The spread over the overnight indexed swap rate is now eighty.
- The bill spread is one hundred and twenty.
- Both widened, the bill spread by more, because investors also ran into bills.

19 Stress, or just a higher policy rate?

Spread over OIS (bp)

Calm	**15**
Stress	**80**
Hike expected	**15**

Hike expected: both rates rise 50 bp, spread unchanged

IN THE LESSON

- Now the crucial question.
- When the unsecured rate rises, is it stress, or is it just a higher policy rate?
- Look at the three bars, each showing the spread over the overnight indexed swap rate.
- On the left, a calm market, with a spread of fifteen basis points.
- In the middle, stress.
- The unsecured rate has jumped but the swap rate has not moved, so the whole rise shows up as a spread of eighty.
- On the right, the market expects the central bank to raise its rate.
- Both the unsecured rate and the swap rate rise by the same amount, so the spread stays at fifteen.
- Rates are higher, but nobody is more worried about the banks.

20 Traps with the short-term gauges

- Unsecured rate up with OIS: policy expected higher
- Spread over OIS up: bank stress, not a rate rise
- Bill gauge also moves when bills are bought for safety
- Libor is discontinued; the idea is not

IN THE LESSON

- Here are the traps.
- First, a rising unsecured rate on its own tells you nothing.
- The overnight indexed swap rate may be rising with it, and then the market is simply expecting a higher policy rate.
- Always look at the spread.
- Second, a widening of the spread over the overnight indexed swap rate is not a sign of higher expected policy rates, since that part has already been stripped out.
- Third, the bill based gauge can widen even if banks are no riskier, just because investors are buying bills in a hurry.
- Fourth, remember the rates have changed.
- Libor is discontinued, but the idea of an unsecured rate against a nearly riskless one lives on.

21 A story: three ways to read a slope

- Friend one: the market expects rates to rise
- Friend two: investors want pay for long-term risk
- Friend three: each maturity has its own buyers
- Each theory reads a forward rate differently

IN THE LESSON

- Imagine three friends looking at the same upward sloping yield curve.
- The first says the market expects short-term interest rates to rise.
- The second says no, investors just want extra pay for locking their money away for a long time, so long yields are higher whatever happens to rates.
- The third says different groups buy different maturities, so each part of the curve is set by its own buyers and sellers.
- All three have a theory, and each theory gives a forward rate a different meaning.
- The traditional term structure theories are exactly these stories, and the exam wants you to say what each one implies for forward rates and for the shape of the curve.

22 Forward rates, and what they might contain

(1 + two-year spot)² = (1 + one-year spot) × (1 + forward)
Forward = expected short rate + term premium

One-year spot rate	Today's one-year rate
Two-year spot rate	Today's two-year rate
Forward rate	Locked in for year two
Expected future short rate	What the market expects
Term premium	Zero under pure expectations

IN THE LESSON

- First, a reminder from Level One.
- The one year rate, one year forward is the rate for the second year that today's curve locks in.
- Growing a dollar for two years at the two year spot rate must equal growing it for one year at the one year spot rate and then for a second year at the forward rate.
- The theories differ over what the forward is made of.
- Under pure expectations, the forward equals the expected future short rate, nothing more.
- Under liquidity preference, the forward equals the expected short rate plus a term premium, which is a reward for holding longer bonds that grows with maturity.

23 Example 6: one forward, three readings

Spot rates: one year 3.00%, two year 3.50%

Forward for year two	$1.035^2 \div 1.03 - 1$	**4.00%**
Pure expectations: expected rate	forward, no premium	**4.00%**
Premium 0.60: expected rate	4.00 − 0.60	**3.40%**
Premium 1.00: expected rate	4.00 − 1.00	**3.00%**

Same forward, three different forecasts

IN THE LESSON

- Example six.
- The one year spot rate is three per cent and the two year spot rate is three point five per cent.
- The forward rate for year two is one point zero three five squared, which is one point zero seven one two two five, divided by one point zero three, minus one.
- That comes to four per cent.
- Now read it three ways.
- Under pure expectations, the market expects the one year rate in a year to be four per cent, a rise of one point.
- If there is a term premium of sixty basis points, the expected rate is four minus zero point six, which is three point four.
- And if the premium is a full one hundred basis points, the expected rate is three, so no rise is expected at all.

24 The same forwards, two readings

Chart: Rate (%) vs Years ahead

- Forward rates
- Expected short rate
- Term premium

IN THE LESSON

- This picture shows the difference between the theories.
- Years ahead run along the bottom, and the rate is up the side.
- The blue line is the forward curve, which you can read straight from today's prices.
- It rises, and levels off.
- The grey flat line is the path of expected short rates, which you cannot observe.
- Under pure expectations the two lines would be on top of each other, and a rising forward curve would mean rising rates.
- Under liquidity preference the forwards sit above the expected rates, and the red gap between them is the term premium, which grows with maturity.
- In this picture, the premium explains all of the slope and the market expects no change at all.

25 Pure expectations and local expectations

- Pure: forward = expected future short rate
- Slope up means rates expected up
- Every maturity: same expected return, any horizon
- Local: the same, but only over short holding periods

IN THE LESSON

- Now the theories one by one.
- Pure expectations says the forward rate is an unbiased forecast of the future short rate.
- So an upward slope means rates are expected to rise, a downward slope means they are expected to fall, and a flat curve means no change.
- It also says every maturity earns the same expected return over a given holding period, so there is no extra reward for holding longer bonds.
- Local expectations is a milder version.
- It says that over a short holding period, every bond, long or short, has the same expected return, which is the risk free rate.
- Over longer horizons it leaves room for premiums, so forwards need not equal expected rates.

26 Example 7: holding a two-year bond for a year

Buy the two-year bond, sell after one year

One-year bond, sure return	the spot rate	**3.00%**
Two-year bond, expect 4.00	$1.035^2 \div 1.04 - 1$	**3.00%**
Two-year bond, expect 3.40	$1.035^2 \div 1.034 - 1$	**3.60%**
Extra for the longer bond	$3.60 - 3.00$	**0.60%**

IN THE LESSON

- Example seven shows what the theories claim about returns.
- Buy a two year zero coupon bond at the two year spot rate of three point five, and sell it after one year.
- What you get depends on the one year rate then.
- If the market expects four per cent, the expected return is one point zero three five squared, divided by one point zero four, minus one, which is three per cent, exactly the one year rate.
- That is the pure expectations result.
- But if the expected rate is only three point four, the expected return is three point six per cent.
- That is sixty basis points more than the sure return of three on a one year bond.
- That extra is the premium for taking the price risk.

27 Liquidity preference theory

- Investors prefer short bonds; borrowers prefer long
- Longer bonds must pay a term premium
- Premium rises with maturity
- Forwards overstate expected rates; flat rates, rising curve

IN THE LESSON

- Liquidity preference theory adds a twist.
- Most investors would rather hold short bonds, whose prices barely move, and most borrowers want to borrow long.
- To tempt investors into longer bonds, borrowers must pay a term premium, and the premium is bigger the longer the bond.
- So forward rates overstate expected future short rates by the premium.
- This is the first theory in which the curve can slope upward without anyone expecting rates to rise.
- Even if short rates are expected to stay flat, the curve slopes up gently because of the premium.
- In an exam, this is the theory to name when a mildly rising curve comes with unchanged expectations about interest rates.

28 Segmented markets and preferred habitat

- Segmented: each maturity is its own market
- Yields set by supply and demand in the segment
- Preferred habitat: natural homes, but they can move
- Demand can reshape the curve; expected rates unchanged

IN THE LESSON

- Two more theories are about demand and supply.
- Segmented markets theory says each maturity is a separate market, with its own buyers and sellers, and the yield at each maturity is set only by supply and demand in that segment.
- Pension funds buy long bonds because their promises are long.
- A bank treasurer buys short bills.
- Neither moves.
- Preferred habitat theory agrees that each group has a natural home, but says they will leave it if paid enough.
- Say pension demand pushes the ten year yield from three point nine to three point six.
- Yields in other segments are not independent of that.
- Arbitrageurs and flexible investors move in, and expected rates need not change at all.

29 The theories on one line

- Pure expectations
- Local expectations
- Liquidity preference
- Preferred habitat
- Segmented markets

IN THE LESSON

- Here are the five theories on a single line, from left to right.
- On the left, the theories where only expectations matter.
- Pure expectations sits at the very end, with no premium of any kind.
- Local expectations is a little to its right, since it allows premiums for longer holding periods.
- In the middle is liquidity preference, which keeps expectations but adds a premium that grows with maturity.
- Further right is preferred habitat, where demand in each segment matters, though investors will switch for a price.
- At the far right is segmented markets, where supply and demand in each maturity decide the yield and expectations barely matter.

30 The theories compared

Is a forward the expected future rate?

Theory	Forward = forecast?
Pure expectations	Yes
Local expectations	Short term
Liquidity preference	No: premium
Segmented or habitat	No: demand

IN THE LESSON

- Here is the comparison to keep.
- Pure expectations: the curve is driven by expected short rates, and a forward equals the expected rate.
- Local expectations: the same idea, but only over short holding periods.
- Liquidity preference: expected rates plus a term premium, so forwards are too high as forecasts.
- Segmented markets: supply and demand in each maturity, and the forward is not a forecast at all.
- Preferred habitat: supply and demand again, but with investors who will move for a price, so rates and demand both matter.
- In the right column, notice that only the first two let you read a forward as a forecast, and only the first strictly so.

31 The trap: what explains the shape?

- Upward slope alone proves no rate rise
- Pension or insurer demand: segmented or habitat
- Compensation for price risk: liquidity preference
- Only pure expectations makes slope a forecast

IN THE LESSON

- Here is the trap that the exam loves.
- You are given a curve that slopes upward, and asked what it shows.
- Do not jump to rising rates.
- Instead, ask which theory could explain the shape without changing expected rates.
- If the vignette says that pension schemes were required to buy long bonds, or that insurers like a particular maturity, that is demand, and the answer is segmented markets or preferred habitat.
- If it says investors need compensation for price risk on long bonds, that is liquidity preference.
- Only if the case says forwards are unbiased forecasts does an upward slope mean rising rates.
- Read the wording of the vignette, then pick the theory it describes.

32 Recap: the formulas and the ideas

I-spread = yield − swap Swap spread = swap − government
Gauge = unsecured − OIS Forward = expected + premium

I-spread	Spread over swaps
Swap spread	Bank risk over government
Credit gauge	Wider means stress
Forward rate	Locked in by today's curve
Term premium	Zero in pure expectations

IN THE LESSON

- Let's pull it together.
- The I-spread is the bond yield minus the swap rate of the same maturity.
- The swap spread is the swap rate minus the government yield of the same maturity, and it reflects bank credit and liquidity risk plus supply and demand.
- The short-term credit gauge is an unsecured bank rate minus the overnight indexed swap rate, and a wider gap with steady policy expectations means stress.
- The forward equals the expected short rate plus a term premium, where the premium is zero under pure expectations.
- Then there is the shape: expectations, premium, and demand are three different reasons for a curve to slope.

33 Try three quick questions

1. 5y swap 3.80%, 5y government 3.45%. Swap spread?
   Answer: 3.80 − 3.45 = 0.35, so 35 bp.
2. Unsecured 4.40 to 4.60, OIS 4.25 to 4.45. Stress?
   Answer: No: spread stays 15 bp; higher expected policy rate.
3. 1y spot 2.00%, 2y spot 2.50%. Pure expectations?
   Answer: $1.025^2 \div 1.02 - 1 \approx 3.00\%$ expected.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A five year swap rate is three point eight zero and the five year government yield is three point four five.
- What is the swap spread?
- Three point eight minus three point four five is thirty five basis points.
- Question two.
- The unsecured three month rate rises from four point four zero to four point six zero, and the overnight indexed swap rate rises from four point two five to four point four five.
- Is this stress?
- No.
- The spread stays at fifteen, so it is a higher expected policy rate.
- Question three.
- The one year spot rate is two per cent and the two year is two point five.
- What forward does pure expectations treat as the expected rate?
- About three per cent.