CHARTA LEARNING · LESSON NOTES

Running a bond portfolio

Portfolio Construction

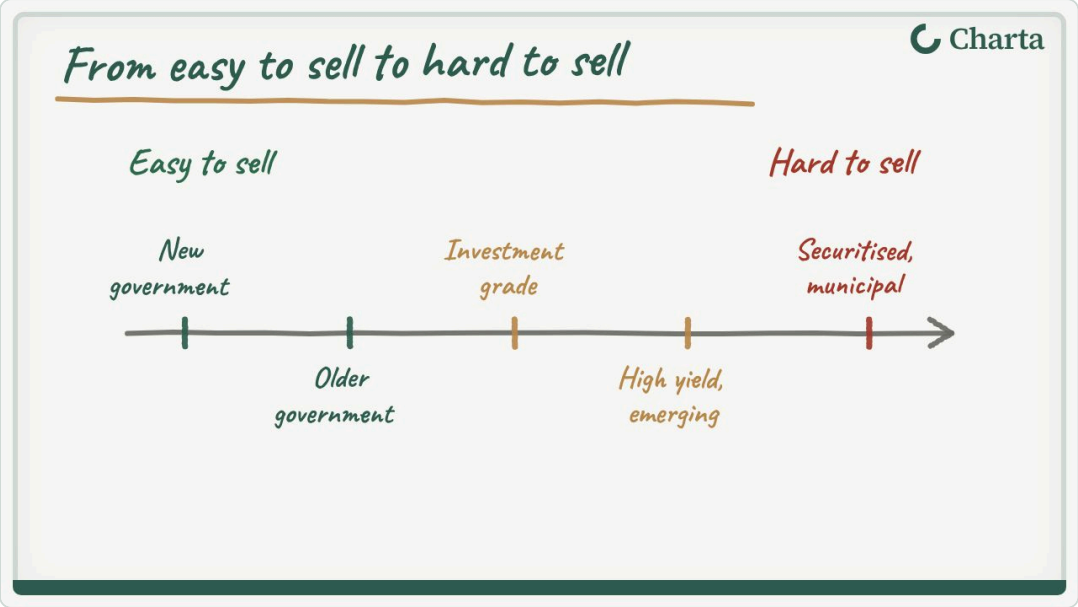
1 A story: the market with no shop window

- Shares: one exchange, one visible price
- Bonds: dealers, by phone and message
- Many issues rarely trade after they are sold
- A bond with no recent trade has no fresh price

IN THE LESSON

- Think about buying a share in a big company.
- There is one exchange, one price on a screen, and you can usually sell in seconds.
- Bonds are not like that.
- Most bonds are traded over the counter, which means by phone or message between you and a dealer, a firm that stands ready to buy from you and sell to you.
- There is no single screen price, and most bonds sit for years in the portfolios of insurers and pension funds.
- A bond that has not traded for a while has no fresh price.
- Imran Doyle has to run his fund in that world.

2 From easy to sell to hard to sell



IN THE LESSON

- Let us line the bond market up on one line.
- At the far left, the easy end, are newly issued government bonds, called sovereign bonds.
- The newest issue of each maturity is the benchmark, the one every dealer quotes, and a large order can be filled quickly.
- Next come older government bonds, called seasoned issues.
- Once a bond is tucked into buy and hold portfolios, few come back to the market.
- Then investment grade corporate bonds, then high yield and emerging market bonds, where borrowers are riskier and buyers are fewer.
- At the hard end sit securitised and municipal bonds, split into many small issues that may not trade for weeks.
- Moving right, the extra yield rises, and so does the cost of getting out.

3 What illiquidity costs to trade

Round trip cost, as a share of price (illustration)

Bond type	Bid-ask spread
New government bond	0.05%
Investment grade corporate	0.5%
High yield bond	1.2%
Small private placement	1.5%

IN THE LESSON

- Liquidity shows up as a cost.
- Every dealer quotes two prices: a bid, which is what the dealer pays you, and an ask, which is what the dealer charges you.
- The gap between them is the bid ask spread, and an investor who buys and later sells pays it once, as a round trip.
- Here are round number illustrations, not real quotes.
- A new government bond might cost point zero five per cent.
- An investment grade corporate bond, point five per cent.
- A high yield bond, one point two per cent.
- And a small private placement, a bond sold directly to a few investors, one point five per cent.
- A wide spread is the price tag on being hard to sell.

4 Example 1: is the pickup worth it?

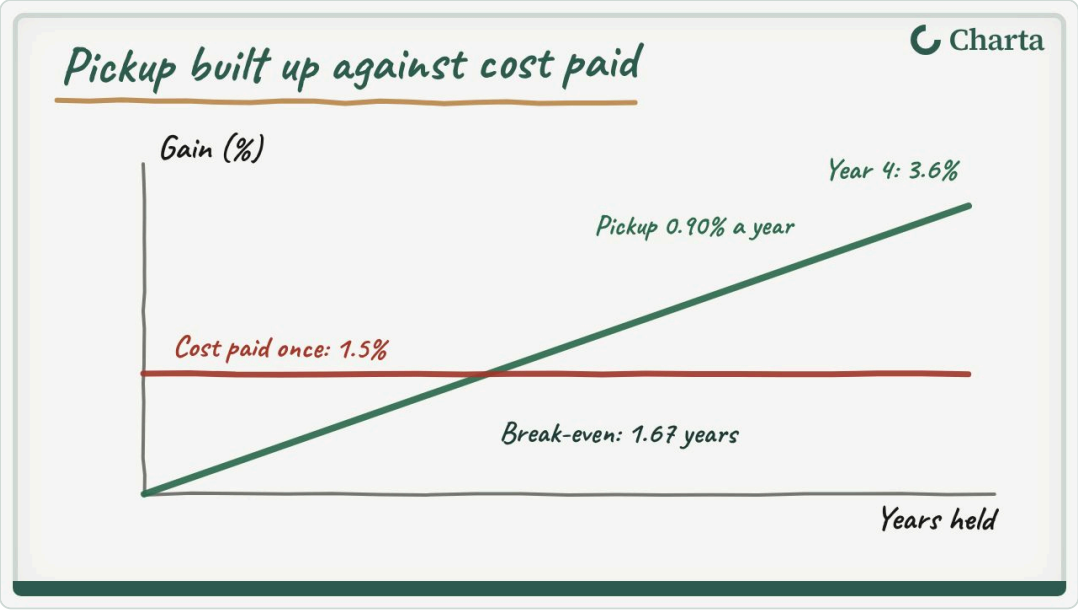
Private placement: pickup 0.90% a year; spread 1.50%

Yield pickup per year	against a liquid bond	**0.90%**
Round trip trading cost	buy at ask, sell at bid	**1.50%**
Break-even holding period	1.50 ÷ 0.90	**1.67 years**
Net if sold after 1 year	0.90 − 1.50	**−0.60%**
Net if held 3 years	3 × 0.90 − 1.50	**+1.20%**

IN THE LESSON

- Now a decision.
- Imran Doyle is offered a private placement that yields point nine zero per cent a year more than a liquid bond of similar credit quality.
- That extra yield is the yield pickup, the reward for a bond that is hard to sell.
- But the spread on this bond is one point five per cent.
- He buys at the ask and sells at the bid, so the round trip costs one point five per cent of the price.
- Divide the cost by the yearly pickup and you get the break even holding period: one point five over point nine, which is one point six seven years.
- Sell after one year, and he is behind by point six per cent.
- Hold for three years, and he is ahead by one point two per cent.

5 Pickup built up against cost paid



IN THE LESSON

- Here is the same decision as a picture.
- The horizontal axis is the number of years Doyle holds the bond, nought to four.
- The vertical axis is the gain in per cent.
- The rising line is the pickup building up, point nine zero per cent each year, and by year four it has reached three point six per cent.
- The flat line is the trading cost, one point five per cent, paid once.
- Where the lines cross is the break even, at one point six seven years.
- To the left of that point, the cost is bigger, and the bond has lost him money against the liquid alternative.
- To the right, the pickup has paid for the cost.
- A fund that may need cash soon should be careful.

6 Liquidity problems and the manager's answers

Doyle balances yield pickup against liquidity needs

Problem	Response
Wide spreads	Hold longer
Model prices	Test with trades
Stress, no buyers	Cash buffer
Need exposure fast	Futures, swaps, ETF

IN THE LESSON

- How does a manager run a fund in this world?
- Doyle has a short list of answers, one for each problem.
- Wide spreads mean trading is expensive, so he trades less and holds longer.
- Many small bonds have no fresh trades, so they are valued by matrix pricing, an estimate built from similar bonds that do trade.
- He tests those prices against real trades whenever he can.
- In a crisis there may be no buyer at all, so he keeps a cash buffer and some very liquid government bonds.
- And when he needs exposure quickly, he can use futures, swaps or a bond exchange traded fund, which is a fund of bonds that trades on an exchange like a share.
- A swap is a contract to exchange payments.

7 Example 2: the stale price trap

Larkfield holds 60m face in small issues; fund is 300m

Face amount held		**60.00m**
Carried at matrix price	99.80 per 100	**59.88m**
Value at a stress bid	94.50 per 100	**56.70m**
Hidden shortfall	59.88 − 56.70	**3.18m**
Share of the 300m fund	3.18 ÷ 300	**1.06%**

IN THE LESSON

- Now the trap.
- Suppose the Larkfield fund holds sixty million of face value in small corporate issues.
- The pricing vendor says the matrix price is ninety nine point eight zero per one hundred, so the holding is carried at fifty nine point eight eight million.
- The price has barely moved.
- Does that make the bonds safe?
- No.
- It means nobody has traded them.
- In a stress, the only bid on offer is ninety four point five zero, which values the holding at fifty six point seven zero million.
- The hidden shortfall is three point one eight million, one point zero six per cent of a three hundred million fund.
- Stale prices hide risk, and an investor who sells fund units at the stale value gets paid too much, at everyone else's expense.

8 A story: the household budget

- A forecast built like a household budget
- Income first, then ageing, then the rate view
- Then losses from defaults, then currency
- Some parts are arithmetic, some are opinion

IN THE LESSON

- Every household keeps a budget, with income, certain costs and a few surprises.
- A bond forecast works the same way.
- Imran Doyle has to tell the board what the Larkfield fund is expected to earn over the coming year, and he builds the answer from parts.
- The income is the starting point.
- Then the bonds age, and that can add a little.
- Then comes the part that depends on his view: what yields do.
- Then the losses from borrowers who fail to pay, and, if some bonds are in another currency, the effect of exchange rates.
- Splitting the forecast shows which parts are arithmetic and which are opinion.

9 Expected return of a bond portfolio

Expected return ≈ yield income + rolldown + price change from yield moves − credit losses ± currency

Yield income	Coupon ÷ price
Rolldown return	Ageing down a sloped curve
Price effect	From a yield view
Credit losses	Default chance × loss
Currency	If not hedged

IN THE LESSON

- Here is the model.
- Expected return is the sum of five parts.
- First, yield income: the coupon divided by the price.
- Second, rolldown return.
- When the yield curve slopes upward, a bond that ages by a year slides down to a shorter maturity, where the yield is lower, and its price rises, provided the curve itself does not move.
- Yield income and rolldown together are called the rolling yield.
- Third, the expected price change from yield moves.
- Fourth, subtract expected credit losses, which is the chance of default times the loss if it happens.
- Fifth, add or subtract the currency gain or loss on any bonds that are not hedged.

10 The price effect

Price change ≈ −D × Δy + ½ × C × (Δy)²

Price change	As a % of price
Duration	Main effect of a move
Change in yield	0.5 pts is 0.005
Convexity	Always adds a little

IN THE LESSON

- The price effect has its own formula, and you already know its pieces.
- The price change is minus duration times the change in yield, plus one half times convexity times the change in yield squared.
- Duration is the main effect: for each one percentage point rise in yields, the price falls by about duration per cent.
- Convexity corrects for the curve in the price yield relationship, and it always adds a small gain, whichever way yields move.
- The change in yield goes in as a decimal, so a rise of half a percentage point is nought point nought nought five.
- This works well for small, parallel shifts in yields, and less well for big or twisting ones.

11 Example 3: Larkfield's forecast

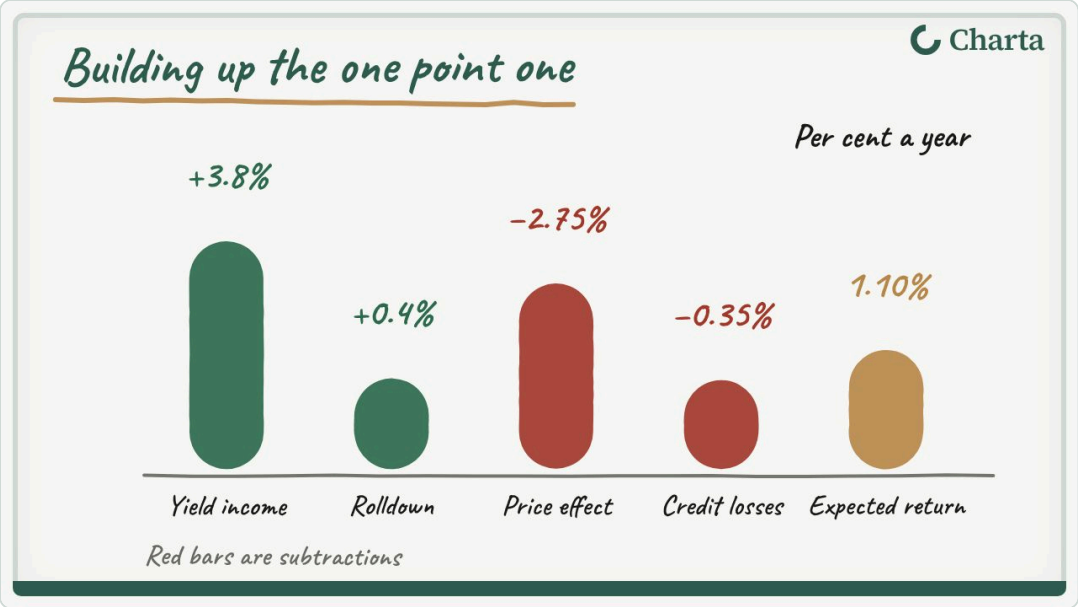
Income 3.8%, rolldown 0.4%, D 7, C 60, yields +0.4 pts

Rolling yield	3.8 + 0.4	**4.20%**
Duration effect	−7 × 0.4	**−2.80%**
Convexity effect	½ × 60 × 0.004²	**+0.048%**
Expected credit losses		**−0.35%**
Expected return	4.20 − 2.80 + 0.048 − 0.35	**1.10%**

IN THE LESSON

- Now Larkfield.
- Imran Doyle's fund has yield income of three point eight per cent and rolldown of point four per cent, so its rolling yield is four point two.
- Duration is seven and convexity is sixty.
- He expects yields to rise by point four of a percentage point.
- The duration effect is minus seven times point four, which is minus two point eight zero per cent.
- The convexity effect is one half times sixty times point zero zero four squared, which is plus point zero four eight.
- Expected credit losses are point three five.
- Add it up and you get about one point one zero per cent.
- Not much, because the rate view has eaten almost all of the income.

12 Building up the one point one



IN THE LESSON

- Here are those parts as bars.
- The vertical axis is per cent a year.
- The two green bars are the rolling yield: yield income of three point eight and rolldown of point four.
- They are the bulk of the return, and they are close to arithmetic.
- The first red bar is the price effect, minus two point seven five.
- It is large because it rests on the forecast that yields rise.
- The second red bar is the expected credit loss, point three five.
- The last bar is what is left, one point one zero per cent.
- Notice how thin it is.
- A small change in the yield view would swing the whole answer, which is why the board should challenge that bar first.

13 Example 4: how sure is the forecast?

Same fund, three views on yields

Yields unchanged	4.20 − 0.35	**3.85%**
Yields fall 0.4 pts	4.20 + 2.848 − 0.35	**6.70%**
Yields rise 0.4 pts	4.20 − 2.752 − 0.35	**1.10%**
Rise that erases the return	3.85 ÷ 7	**0.55 pts**

IN THE LESSON

- A forecast is only as good as its view, so Doyle shows the board three cases.
- If yields stay where they are, there is no price effect, and the return is four point two less point three five, which is three point eight five per cent.
- If yields fall by point four, duration and convexity add two point eight four eight, and the return is six point seven zero.
- If yields rise by point four, we are back at one point one zero.
- Now a useful question: how far can yields rise before the return falls to zero?
- Using duration alone, three point eight five divided by seven is point five five of a percentage point.
- That is the cushion the income gives him.

14 Example 5: add a currency view

20% of Larkfield is unhedged foreign bonds

Return in local terms	from Example 3	**1.10%**
Share unhedged		**20%**
Expected currency move		**−2.5%**
Currency effect on the fund	20% × −2.5	**−0.50%**
Expected return, home currency	1.10 − 0.50	**0.60%**

IN THE LESSON

- Now the currency part.
- Suppose twenty per cent of the fund is in unhedged bonds priced in a foreign currency, and Doyle expects that currency to fall by two point five per cent against the fund's home currency.
- For simplicity we use the same one point one zero per cent local return from the last example for the whole fund.
- The currency effect on the fund is twenty per cent times minus two point five, which is minus point five zero.
- So the expected return in home currency drops from one point one zero to point six zero per cent.
- A currency view can eat a bond view entirely, which is why many managers hedge currency away and take that risk only on purpose.

15 Reading the model: where it can mislead

- Rolldown assumes the curve does not move
- Duration and convexity suit small parallel shifts
- Reinvestment income and tax are left out
- Income is near arithmetic; yield moves are a view

IN THE LESSON

- Last, how to read the model, and where it misleads.
- The rolldown figure only holds if the yield curve stays exactly as it is today.
- If the curve moves, the rolldown is not earned.
- The duration and convexity formula is an approximation that suits small, parallel shifts in yields.
- And the model leaves some things out: income from reinvesting the coupons over the horizon, and tax.
- So when a colleague hands you a forecast, ask which parts are income and ageing, close to arithmetic, and which rest on a view of yields, credit or currency.
- That tells you how much to trust the number.

16 A story: the mortgage

- House: a deposit plus a mortgage
- Gains and losses land on the deposit
- Bond managers borrow in the same way
- Return on equity: what the client's own money earns

IN THE LESSON

- Most people buy a house with a deposit and a mortgage.
- Suppose the house rises in value.
- The gain belongs entirely to you, but you only put in the deposit, so your return on the deposit is large.
- Suppose the house falls.
- The loss also lands on your deposit, and the mortgage still has to be paid.
- That is leverage: using borrowed money to hold more than your own money could buy.
- A bond manager does the same.
- The client's own money is the equity.
- The borrowing sits on top of it, and the total is the invested funds.
- Leverage lifts the return on equity when the bonds earn more than the loan costs, and it lowers it when they do not.

17 Return on equity with borrowing

rE = rI + (VB ÷ VE) × (rI − rB)

Return on equity	What the client earns
Return on invested funds	Return on all the bonds
Borrowing cost	Interest paid on the loan
Borrowed ÷ equity	How much is borrowed

IN THE LESSON

- The return on equity is the return on invested funds, plus the amount borrowed divided by equity, times the gap between what the investments earn and what the borrowing costs.
- The first part is the return you would have had with no borrowing.
- The second part is the bonus, or the penalty.
- If the investments earn more than the cost of borrowing, the gap is positive, and the more you borrow relative to equity, the bigger the bonus.
- If the gap is negative, the same multiplier makes the penalty bigger.
- Leverage multiplies the spread, not the return itself.

18 Example 6: Larkfield Plus borrows

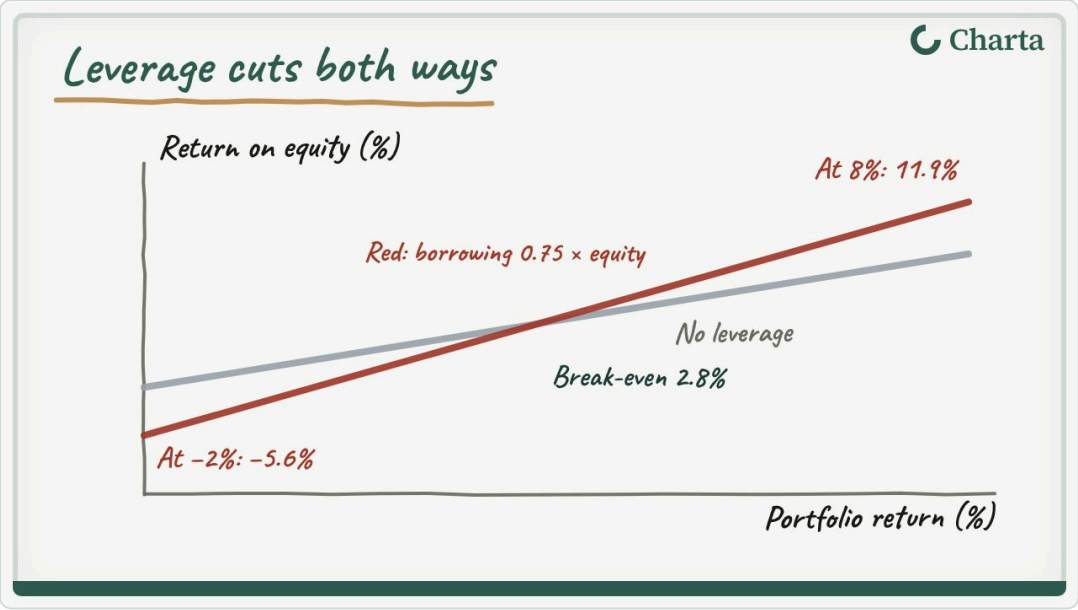
Equity 80m, repo borrowing 60m at 2.8%, bonds earn 5.2%

Borrowed ÷ equity	60 ÷ 80	**0.75**
Spread over borrowing	5.2 − 2.8	**2.4%**
Uplift from leverage	0.75 × 2.4	**1.80%**
Return on equity	5.2 + 1.80	**7.00%**
Check in money	(7.28 − 1.68) ÷ 80	**7.00%**

IN THE LESSON

- Imran Doyle has a levered sleeve, called Larkfield Plus.
- It has eighty million of equity from clients, and it borrows sixty million in the repo market at two point eight per cent.
- The bonds it buys earn five point two per cent.
- Borrowed divided by equity is sixty over eighty, point seven five.
- The spread is five point two less two point eight, two point four.
- The uplift is point seven five times two point four, one point eight zero.
- So the return on equity is five point two plus one point eight, seven per cent.
- Check it in money.
- The bonds earn seven point two eight million, and the loan costs one point six eight million.
- What is left, divided by eighty million, is seven per cent again.

19 Leverage cuts both ways



IN THE LESSON

- Now the picture.
- The horizontal axis is the return on the bond portfolio, from minus two to eight per cent.
- The vertical axis is the return on equity.
- The grey line is no leverage, where equity simply earns what the bonds earn.
- The red line is Larkfield Plus, with borrowing of point seven five times equity.
- Both lines pass through the same point where the portfolio earns two point eight, the cost of borrowing.
- There, borrowing neither helps nor hurts.
- Above it, the levered line is steeper: at eight per cent it earns eleven point nine.
- Below it, the levered line falls faster: at minus two it loses five point six.
- Leverage does not create skill.
- It only turns the volume up, in both directions.

20 Example 7: when the bonds fall short

Same sleeve: equity 80m, borrowed 60m at 2.8%

Bonds earn 2.8%	equals the borrowing cost	**2.80%**
Bonds earn 1.0%	1.0 + 0.75 × (1.0 − 2.8)	**−0.35%**
Bonds earn −2.0%	−2.0 + 0.75 × (−4.8)	**−5.60%**
Loss in money on 80m	5.6% × 80	**−4.48m**
Unlevered loss, for comparison	levered is 2.8× bigger	**−2.00%**

IN THE LESSON

- Let us see the downside in numbers, with the same sleeve.
- If the bonds earn exactly the borrowing cost, two point eight per cent, leverage adds nothing.
- Now suppose they earn only one per cent.
- The return on equity is one plus point seven five times one minus two point eight, which is minus point three five per cent.
- The bonds made money, yet the clients lost it.
- Suppose they lose two per cent.
- The return on equity is minus two plus point seven five times minus four point eight, which is minus five point six zero, and on eighty million of equity that is a loss of four point four eight million.
- Without leverage the loss would have been two per cent, so the same move hurt two point eight times as much.

21 Instruments that create leverage

Four routes to more exposure on the same equity

Instrument	How it adds exposure
Repo, securities lending	Cash buys more bonds
Futures	Small margin, big exposure
Swap	Receive fixed, add duration
Inverse floater	Leverage inside the note

IN THE LESSON

- How do managers get leverage?
- Four main routes.
- A repurchase agreement, or repo, is a secured loan: the fund sells a bond with a promise to buy it back later at a slightly higher price, and uses the cash to buy more bonds.
- Securities lending works the other way round: the fund lends bonds out, takes cash as collateral, and invests that cash.
- Futures give exposure to a bond price for a small margin deposit.
- An interest rate swap exchanges fixed payments for floating ones, so receiving fixed adds duration without spending cash.
- And a structured note such as an inverse floater pays a coupon that falls when rates rise, with leverage built into the note.
- The first route borrows cash.
- The other three create exposure without borrowing.

22 Example 8: futures are not free

Futures notional 40m, duration 5, margin 5%, buffer 4.0m

Initial margin	5% × 40m	**2.0m**
Loss if yields rise 0.5 pts	40m × 5 × 0.005	**1.0m**
Cash buffer at the start		**4.0m**
Buffer after margin and loss	4.0 − 2.0 − 1.0	**1.0m**
After a second 0.5 pt rise	1.0 − 1.0	**0.0m**

IN THE LESSON

- A word on derivative leverage, because it feels free.
- Suppose Doyle adds a futures position with a notional of forty million and a duration of five.
- The exchange asks for an initial margin of five per cent, two million, in cash.
- Now yields rise by half a percentage point.
- The position loses forty million times five times point zero zero five, one million, and that must be paid in cash the same day, as variation margin.
- If the fund started with a cash buffer of four million, it now has one million left, after two for margin and one for the loss.
- Another half point rise takes another million, and the buffer is gone.
- After that he has to sell bonds, probably at a bad moment.

23 The dangers, and the trap

- Losses magnified when return falls below cost
- Funding risk: repo withdrawn, margin called
- Forced sales into thin markets at poor prices
- Counterparty risk; derivative leverage is not free

IN THE LESSON

- First, losses are magnified: once the portfolio earns less than the cost of borrowing, every point of shortfall is multiplied.
- Second, funding risk: repo lenders can refuse to roll the loan over, raise the haircut, or call for more collateral, and futures brokers call margin.
- Third, forced sales: to meet the call, the manager sells into a thin market at a poor price, which pushes prices down and brings more calls.
- This ties straight back to liquidity.
- Fourth, counterparty risk, if the other side of a swap or repo fails.
- The trap is to treat derivative leverage as costless because no cash changed hands at the start.
- The margin and liquidity demands are the cost.

24 Mistakes to avoid so far

- Valuing thin bonds at stale prices
- Counting pickup but not trading cost
- Forgetting rolldown needs a steady curve
- Treating derivative leverage as costless
- Ignoring the return when bonds earn less than the loan

IN THE LESSON

- Let us collect the common mistakes so far.
- One: valuing thinly traded bonds at stale matrix prices, so risk is hidden and units are redeemed at the wrong value.
- Two: counting the yield pickup of an illiquid bond but forgetting the trading cost and the chance of a forced sale.
- Three: forgetting that rolldown only holds if the yield curve stays put, and that the forecast leaves out reinvestment income and tax.
- Four: treating derivative leverage as costless, when margin calls drain cash.
- Five: ignoring what leverage does to the return on equity when the bonds earn less than the loan costs.

25 A story: two clients, one bond

- Pension fund: tax exempt, compares returns before tax
- Private client: keeps only what is left after tax
- Same bond, different value to each investor
- Some income may still be taxed at source

IN THE LESSON

- Two clients can hold exactly the same bond, and it can be worth more to one than the other.
- The first is the Larkfield pension scheme, a pension fund that pays no tax on its investments.
- It can compare bonds on their return before tax, and mostly ignore whether that return arrives as coupon or as price gain.
- Even so, some streams, such as interest from abroad, may still be taxed at source.
- The second is Ms Inez Varga, a private client of Fenmore Capital.
- She pays tax on interest, and on gains when she sells.
- For her, the number that matters is the return she keeps.
- Her portfolio must be run to maximise the return after tax.

26 Comparing taxable and tax exempt yields

After-tax yield = yield × (1 − t)
Taxable-equivalent yield = exempt yield ÷ (1 − t)

Taxable yield	Before tax
Tax rate	The investor's own rate
After-tax yield	What a taxable bond keeps
Exempt yield	Yield of the exempt bond
Taxable-equivalent yield	What a taxable bond must pay

IN THE LESSON

- Two small formulas do most of the work.
- The after tax yield on a taxable bond is its yield times one minus the tax rate.
- The taxable equivalent yield of a tax exempt bond is its yield divided by one minus the tax rate.
- It answers the question: what would a taxable bond have to yield, before tax, to leave this investor as well off?
- Use the investor's own tax rate, and compare bonds of similar credit quality and maturity.
- A higher tax rate makes an exempt bond more valuable.

27 Example 9: which bond for Ms Varga?

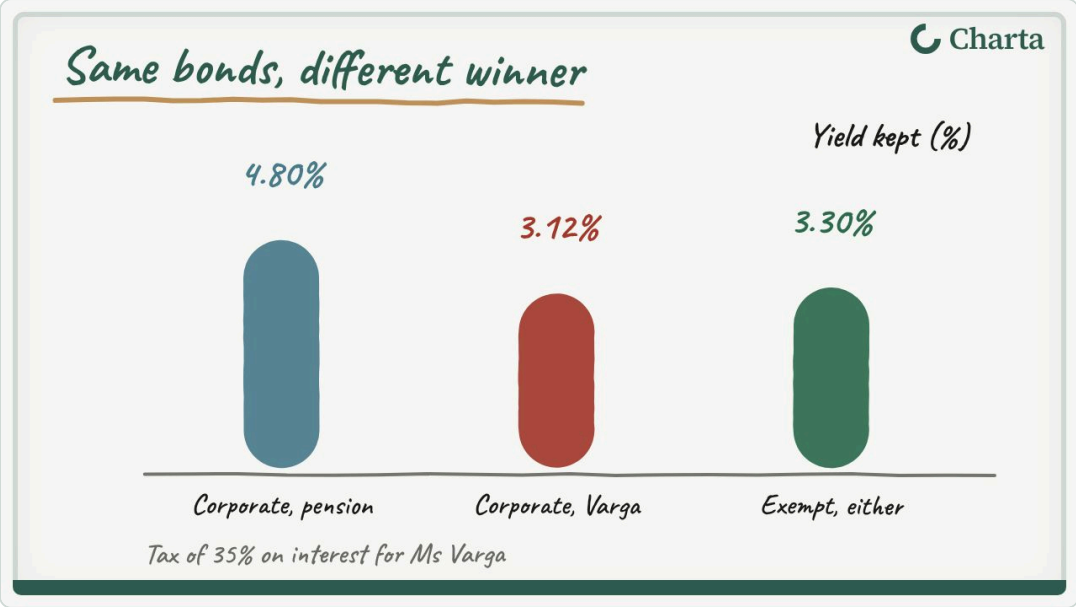
Tax 35% on interest. Corporate 4.80%, exempt 3.30%

Corporate after tax	4.80 × (1 − 0.35)	**3.12%**
Exempt bond yield	no tax to pay	**3.30%**
Taxable equivalent of exempt	3.30 ÷ 0.65	**5.08%**
Better for Ms Varga	3.30 > 3.12	**Exempt**
Better for the pension scheme	4.80 > 3.30	**Corporate**

IN THE LESSON

- Ms Varga pays thirty five per cent tax on interest.
- Doyle is choosing between a taxable corporate bond yielding four point eight zero per cent and a tax exempt local authority bond yielding three point three zero, of similar credit quality and maturity.
- After tax, the corporate bond keeps four point eight times point six five, which is three point one two per cent.
- The exempt bond keeps all of its three point three zero.
- So the exempt bond wins for her.
- Put it the other way round: the taxable equivalent of the exempt bond is five point zero eight per cent, and the corporate bond falls short of that.
- For the pension scheme there is no tax, so four point eight zero beats three point three zero, and the corporate bond wins.

28 Same bonds, different winner



IN THE LESSON

- Here is that result as bars.
- The vertical axis is the yield each investor keeps, in per cent.
- The first bar is the corporate bond for the pension scheme, four point eight zero.
- It keeps the whole coupon.
- The second bar is the same corporate bond for Ms Varga, three point one two, because the tax takes more than a third of it.
- The third bar is the exempt bond, three point three zero, the same for either investor, because there is no tax to take.
- Compare the bars within each investor.
- For the pension scheme the first bar beats the third.
- For Ms Varga the third bar beats the second.
- The bonds did not change.
- Only the owner changed.

29 Levers for a taxable investor

Four levers once tax is counted

Lever	What it does
Coupon or gain	Changes when tax falls
Timing and holding period	Defers tax, may cut rate
Loss harvesting	Offsets gains
Tax-exempt bonds	Skip the tax

IN THE LESSON

- Beyond the choice of bond, a taxable investor has four levers.
- The mix of coupon income and capital gain matters, because income is taxed as it arrives while a gain can wait until the bond is sold.
- The timing of sales and the holding period matter, because deferring a gain defers the tax, and in many places gains on assets held long enough face a lower rate.
- Loss harvesting means realising a loss to offset gains, taking care not to buy the same bond straight back where the rules forbid it.
- And tax exempt bonds, where available, simply skip the tax.
- Each one counts the tax before comparing returns.

30 Example 10: timing and loss harvesting

Tax 35% within 12 months, 15% after. Q gain 100k, P loss 60k

Sell Q now, held 11 months	100k × 35%	**35.0k**
Sell Q after 12 months	100k × 15%	**15.0k**
Saving from waiting	35.0 − 15.0	**20.0k**
Sell P, offset gains of 90k	60k × 35%	**21.0k**
Total tax saved	20.0 + 21.0	**41.0k**

IN THE LESSON

- Back to Ms Varga's portfolio.
- She pays thirty five per cent on gains from assets held twelve months or less, and fifteen per cent on gains from assets held longer.
- Bond Q has a gain of one hundred thousand and was bought eleven months ago.
- If Doyle sells now, the tax is thirty five thousand.
- If he waits past twelve months, it is fifteen thousand, a saving of twenty thousand, provided the price holds.
- Bond P has a loss of sixty thousand, and she has other short term gains of ninety thousand this year.
- Selling P offsets sixty thousand of them, and saves twenty one thousand.
- Together the two moves save forty one thousand in tax.

31 Example 11: the drag of high turnover

Tax 15% on held gains, 35% on traded gains

Buy and hold: gain 1.00%	1.00 × (1 − 0.15)	**0.85%**
Active: gross gain 1.20%	1.20 × (1 − 0.35)	**0.78%**
Gross gain active needs	0.85 ÷ 0.65	**1.31%**
Extra pre-tax edge needed	1.31 − 1.00	**0.31 pts**

IN THE LESSON

- Now the trap that catches active managers.
- Compare two strategies for Ms Varga.
- In a buy and hold strategy, the gain is one per cent a year, and it is taxed at fifteen per cent when finally realised, so she keeps point eight five.
- An active, high turnover strategy sells often.
- Its gains are mostly short term, taxed at thirty five per cent.
- Suppose it earns a gross gain of one point two per cent.
- After tax she keeps point seven eight, less than the passive strategy, despite the better gross result.
- To keep point eight five after tax, the active strategy would need a gross gain of point eight five divided by point six five, one point three one per cent.
- That is point three one more, before counting extra trading costs or the benefit of deferral.

32 Propose and defend: advice for Ms Varga

- Buy the exempt bond: 3.30% beats 3.12% after tax
- Hold bond Q past 12 months: save 20k
- Sell bond P now: its loss offsets gains
- Avoid a high turnover mandate; mind the risks

IN THE LESSON

- Now put the advice together, and defend it.
- For Ms Varga, Doyle proposes to buy the exempt bond, because three point three zero beats three point one two after tax.
- He proposes to hold bond Q past twelve months, saving twenty thousand, and to sell bond P now, to offset her gains.
- And he advises against a high turnover active mandate.
- What could go wrong?
- The price of Q could fall while she waits, and that risk can outweigh the tax saving.
- Tax rules can change.
- And the exempt bond may be less liquid than a corporate bond, which brings us back to the first topic.
- A good adviser states these risks beside the recommendation.

33 Recap: the lesson in five lines

- Liquidity: weigh pickup against cost and stale prices
- Return: income + rolldown + price effect − losses ± currency
- Leverage: $r_E = r_I + (V_B \div V_E)(r_I - r_B)$
- Dangers: funding, margin calls, forced sales
- Tax: compare after-tax returns; count the turnover drag

IN THE LESSON

- Let us pull the lesson together.
- First, bond liquidity falls from new government bonds to securitised and municipal bonds, and the yield pickup must be set against trading cost, stale pricing and forced sales.
- Second, expected return is yield income plus rolldown, plus the price effect from duration and convexity, less credit losses, plus or minus currency, and each part has its limits.
- Third, leverage adds the borrowed share times the spread, and works against you when the bonds earn less than the loan costs.
- Fourth, borrowing brings funding risk, margin calls and forced sales.
- Fifth, a taxable investor keeps only what is left after tax, so tax shapes every decision.

34 Try three quick questions

1. Income 3%, rolldown 0.5%, D 5, yields +0.6 pts, losses 0.2%. Return (ignore convexity)?
   Answer: 3.5 − 5 × 0.6 − 0.2 = 0.30%.
2. Portfolio earns 4%, loan costs 2%, borrowed = equity. Return on equity?
   Answer: 4 + 1 × (4 − 2) = 6%.
3. Tax 30%. Taxable bond 3.9%, exempt bond 2.8%. Which is better?
   Answer: 3.9 × 0.7 = 2.73, below 2.8: the exempt bond.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A bond fund has yield income of three per cent and rolldown of point five per cent.
- Duration is five, yields rise by point six of a percentage point, and expected credit losses are point two per cent.
- Ignore convexity.
- What is the expected return?
- Three point five, less five times point six, which is three, less point two, gives point three zero per cent.
- Question two.
- A portfolio earns four per cent, borrowing costs two per cent, and the amount borrowed equals equity.
- What is the return on equity?
- Four plus one times two, so six per cent.
- Question three.
- An investor pays thirty per cent tax.
- A taxable bond yields three point nine per cent and an exempt bond yields two point eight.
- Which is better?
- Three point nine times point seven is two point seven three, which is below two point eight, so the exempt bond is better for this investor.