CHARTA LEARNING · LESSON NOTES

Capital structure: debt, equity and the best mix

Corporate Issuers

1 A story: buying a house

- Debt = borrowed money: fixed interest, repaid
- Equity = owners' money: keeps what is left
- Capital structure = the mix of debt and equity
- Leverage = how much debt is used

IN THE LESSON

- Think about buying a house.
- You have some savings, and you borrow the rest from a bank.
- How much of your own money, and how much of the bank's, is a choice.
- A big loan means a small deposit, and the other way round.
- Companies face exactly the same choice.
- A company needs money to build factories, buy machines and hire people.
- It can raise that money in two ways.
- Debt is borrowed money.
- The lender is promised fixed interest and the money back, whatever happens.
- Equity is the owners' money.
- The owners are promised nothing, but they keep whatever is left over.
- The mix of the two is called the capital structure.
- Using a lot of debt is called high leverage.

2 Example 1: two identical firms (the set-up)

Same assets of $1,000, same operating profit, different funding

Firm A: owners' money	no debt	**$1,000**
Firm B: debt at 6%	interest every year	**$500**
Firm B: owners' money	the rest	**$500**
Firm B: interest bill	6% × $500	**$30**

IN THE LESSON

- Let's see what debt does with a small example.
- Two companies, A and B, are identical.
- Each owns assets worth one thousand dollars and earns the same operating profit, which is the profit before paying any interest.
- Company A is paid for entirely by its owners, so it has no debt.
- Company B borrowed five hundred dollars at six per cent interest, and its owners put in the other five hundred.
- Six per cent of five hundred is thirty dollars.
- So B must pay thirty dollars of interest every year, good year or bad.
- We ignore tax for now.
- The question is, what return do the owners earn?
- Return on equity is the profit left for the owners, divided by the owners' money.

3 Example 1: a good year and a bad year

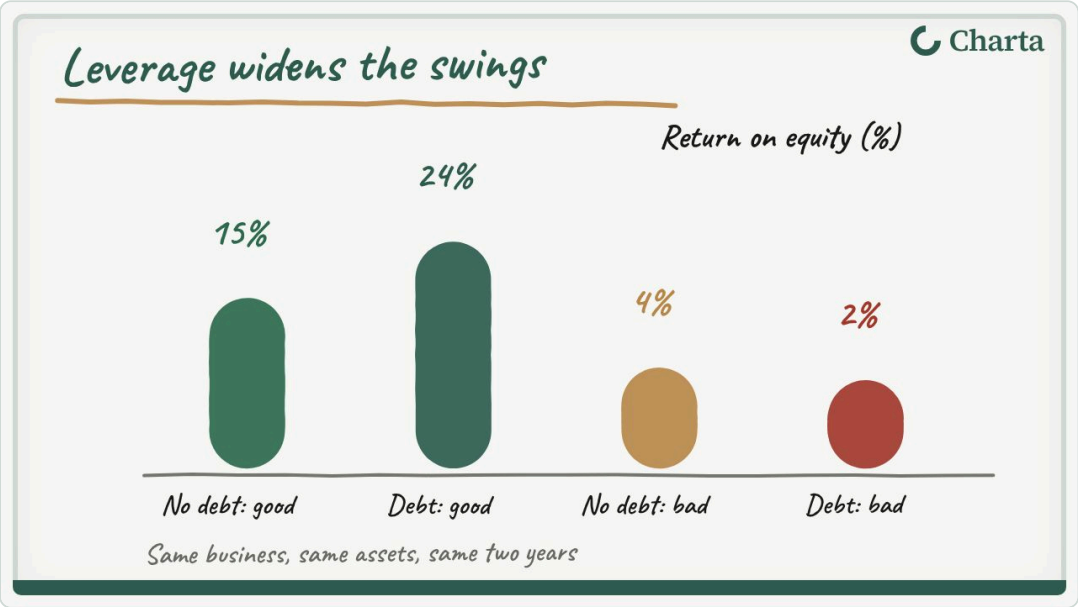
Return on equity = profit left for owners ÷ owners' money

A, good year (profit $150)	150 ÷ 1,000	**15%**
B, good year	(150 − 30) ÷ 500	**24%**
A, bad year (profit $40)	40 ÷ 1,000	**4%**
B, bad year	(40 − 30) ÷ 500	**2%**

IN THE LESSON

- Now let's run two years.
- In the good year, operating profit is one hundred and fifty dollars.
- Company A has no interest, so the owners keep all one hundred and fifty.
- On a thousand dollars of their money that is fifteen per cent.
- Company B pays thirty in interest, leaving one hundred and twenty for the owners.
- On five hundred dollars of their money that is twenty four per cent.
- Debt boosted the return.
- In the bad year, operating profit falls to forty.
- Company A earns four per cent.
- Company B pays thirty in interest, leaving ten, which is only two per cent on five hundred.
- Now debt made things worse.
- Same assets, same business, but the return swings much more with debt.

4 Leverage widens the swings



IN THE LESSON

- Here are the four returns as bars.
- The first two bars are the good year, and the last two are the bad year.
- With no debt, the owners earn fifteen per cent in the good year and four per cent in the bad year, a gap of eleven points.
- With debt, they earn twenty four per cent and two per cent, a gap of twenty two points.
- The gap doubled.
- That is the central idea of this whole lesson.
- Debt works like a lever.
- It magnifies the gain when times are good and magnifies the pain when times are bad.
- Whether that is worth it depends on how safe the business is, which brings us to the first force.

5 Force 1: business risk

- Business risk = how uncertain operating profit is
- Steady profits and solid assets: more debt is safe
- Volatile profits, few tangible assets: less debt
- Debt adds financial risk on top of business risk

IN THE LESSON

- The first force is business risk.
- This is how uncertain the company's operating profit is, before any financing choice.
- A water utility sells the same amount every year.
- A fashion brand might have a hit one season and a flop the next.
- Remember the lever.
- If profits are steady, the interest bill is easy to meet, and the company can safely borrow a lot.
- If profits swing wildly, the same interest bill can be crushing in a bad year, so the company should borrow less.
- Lenders also like things they can seize if all goes wrong, such as buildings and machines.
- A firm with lots of tangible assets can usually borrow more than one whose value sits in ideas and people.

6 Force 2: the tax shield

- Interest is deductible; dividends are not
- Tax saved = tax rate × interest paid
- That saving is the interest tax shield
- Higher tax rate: bigger shield, more debt

IN THE LESSON

- The second force is tax.
- In most countries, a company pays tax on its profit after subtracting interest.
- So interest is tax deductible.
- Dividends, the payments to owners, are not.
- This means borrowing gets a discount from the government.
- Imagine you could pay part of a bill and have the tax office refund a slice of it.
- That refund is called the interest tax shield.
- The shield equals the tax rate times the interest paid.
- A higher tax rate makes the shield worth more, so it pushes the company towards debt.
- A company that pays no tax, perhaps because it makes losses, gets little value from the shield.
- Let's put a number on it.

7 Example 2: the tax shield in dollars

Operating profit $200, tax rate 25%, interest $40

Tax with no debt	25% × 200	**$50**
Tax with $40 of interest	25% × (200 − 40)	**$40**
Tax saved: the shield	50 − 40	**$10**
Check: rate × interest	25% × 40	**$10**

IN THE LESSON

- A company earns two hundred dollars before interest and tax.
- The tax rate is twenty five per cent.
- With no debt, tax is twenty five per cent of two hundred, which is fifty dollars.
- Now suppose it pays forty dollars of interest.
- Profit before tax drops to one hundred and sixty, and tax is twenty five per cent of that, which is forty dollars.
- Tax fell from fifty to forty, a saving of ten.
- And ten is exactly twenty five per cent of the forty dollars of interest.
- That ten dollars is the tax shield.
- Notice something important.
- Lenders and owners together now receive more than before, because the government takes ten dollars less.

8 Force 3: the cost of financial distress

- More debt: higher chance of struggling to pay
- Direct costs: lawyers, administrators
- Indirect: lost customers, tougher suppliers, lost staff
- Worse for firms with volatile, intangible value

IN THE LESSON

- The third force pulls the other way.
- Financial distress means a company is struggling to pay what it owes.
- The more debt, the more fixed payments, and the more likely trouble becomes.
- And trouble is expensive, even if the company never actually goes bust.
- There are direct costs, such as lawyers and administrators.
- And there are indirect costs, which are often bigger.
- Customers worry that the firm may disappear, so they buy elsewhere.
- Suppliers demand cash upfront.
- Good employees leave.
- Managers spend their time on survival instead of the business, and may sell valuable assets cheaply to raise cash.
- Shareholders and lenders end up paying for all of this in the end.

9 Force 4: agency costs

- Agency problem: one party acts for another
- Debt disciplines managers who might waste cash
- But owners may gamble with the lenders' money
- Lenders respond with monitoring, which costs money

IN THE LESSON

- The fourth force is about conflicts of interest.
- An agency problem arises when one person acts for another, but their interests differ.
- Managers act for shareholders.
- Shareholders also deal with lenders.
- Debt cuts both ways.
- On the good side, a big interest bill forces managers to hand over cash instead of wasting it on empire building.
- On the bad side, shareholders of a heavily indebted firm have an incentive to gamble.
- If a risky project pays off, they win.
- If it fails, the lenders take much of the loss.
- Lenders know this, so they watch the firm closely and add restrictions.
- Watching and restricting cost money.
- These are agency costs.

10 Force 5: asymmetric information and the pecking order

- Managers know more than outsiders
- New shares signal: the price may be too high
- Pecking order: retained profit, then debt, then new equity
- An order of choices, not a target ratio

IN THE LESSON

- The fifth force is information.
- Managers know more about the company than outsiders do.
- This is called asymmetric information.
- Think of a used car seller.
- If a seller is in a hurry to sell, buyers wonder what is wrong with the car.
- The same happens with shares.
- If managers issue new shares, outsiders suspect the managers think the shares are overpriced, so the price falls.
- Managers know this, and so they avoid issuing equity if they can.
- The pecking order theory says companies prefer internal money first, from retained profit.
- If they need more, they borrow.
- Issuing new equity is the last resort.
- Notice that this describes an order of choices, not a target mix.

11 Summary: what pushes towards more or less debt

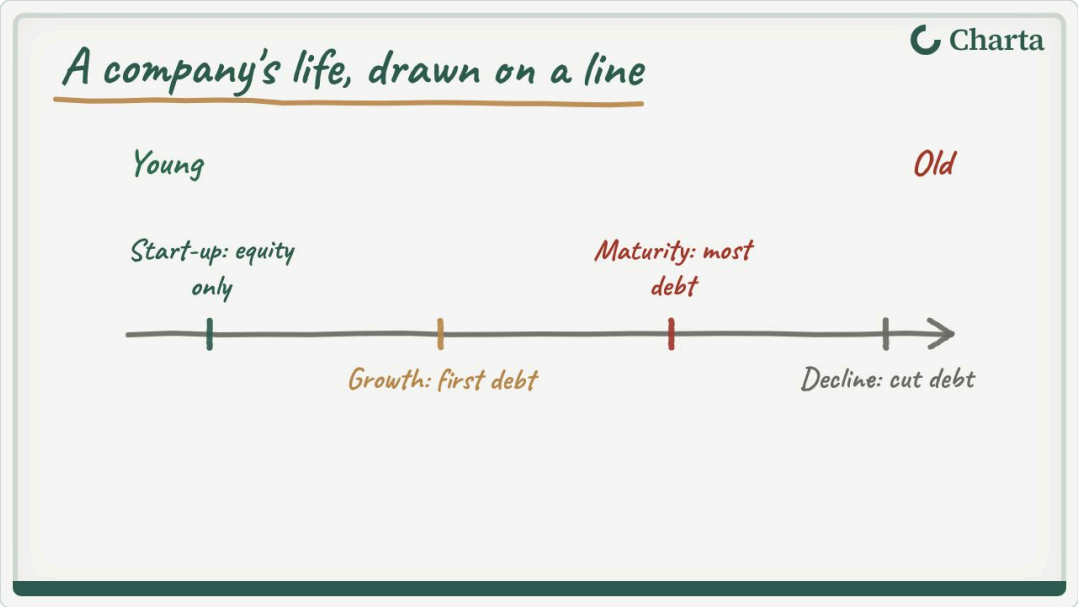
Features of a firm and the direction they push

Feature of the firm	Pushes
Steady cash flows, solid assets	More debt
High tax rate	More debt
Volatile profits	Less debt
Costly distress, few assets	Less debt

IN THE LESSON

- Let's collect the five forces in one place.
- Steady cash flows and tangible assets let a firm carry more debt, because the interest is easy to pay and lenders can seize assets.
- A high tax rate makes the shield bigger, which also favours more debt.
- But volatile profits make the interest bill dangerous, so the firm should borrow less.
- Costly financial distress, for example a business that depends on customer trust, also pushes towards less debt.
- And firms with few tangible assets, such as software companies, can borrow less, because lenders have nothing to seize.
- Agency costs and information problems sit in the background, pulling both ways.
- No single force decides the answer.
- The firm weighs them all.

12 A company's life, drawn on a line



IN THE LESSON

- Companies change as they age, and so does their funding.
- Picture a line from young on the left to old on the right.
- At the far left is the start-up, a brand new business with an idea but few customers.
- It is funded by its founders and by investors who buy equity, because lenders want steady income and something to seize, and the start-up has neither.
- Next is growth, where sales climb fast and cash is eaten up by expansion.
- Some debt appears, but equity still leads.
- At maturity, the business is steady and profitable, and debt use is highest.
- In decline, sales fall, and the aim shifts to cutting debt back.

13 Funding at each stage

Typical funding at each stage of a company's life

Start-up	founders, venture investors	**Equity only**
Growth	new shares, some loans	**Equity-led**
Maturity	bonds and bank loans	**Debt-heavy**
Decline	repay, sell assets	**Cut debt**

IN THE LESSON

- Here is the same story in a short table.
- The start-up relies on founders, friends and specialist investors, and its cost of money is the highest, because most start-ups fail.
- Banks mostly say no.
- In growth, the business has real customers, and cash is still negative, so it keeps selling equity, perhaps to the public for the first time, and borrows modestly, often against assets.
- At maturity, profits are steady, so bonds and bank loans are plentiful and cheap.
- Cash is now spare, so the firm may borrow to pay dividends or buy back shares.
- In decline, lenders get nervous, and borrowing becomes costly and scarce.
- The sensible move is to repay debt, sell assets and shrink the interest bill.

14 Cost and availability: start-up and growth

- Lenders get fixed pay, so they need safety
- Start-up: no profits, no assets, so little debt
- Equity is costly: investors need a big upside
- Growth: revenue and assets build, debt cost falls

IN THE LESSON

- Let's look closer at the young stages, because the reasons matter.
- Why is debt hard to get for a start-up?
- Lenders are paid a fixed amount, so they gain nothing if the business does brilliantly, and they lose if it fails.
- So they lend only when repayment looks very likely, and a start-up has neither profits nor assets.
- Equity investors accept the risk, because they might win big, but they demand a very high expected return.
- So the start-up has expensive equity and almost no debt.
- As the growth stage proceeds, revenue becomes more predictable and assets build up.
- Lenders become willing, and the cost of borrowing starts to fall.

15 Cost and availability: maturity and decline

- Maturity: stable cash flow, cheapest, easiest debt
- Few projects left, so spare cash goes to owners
- Decline: same debt on smaller profit is riskier
- Lenders charge more or refuse; firm deleverages

IN THE LESSON

- Now the older stages.
- At maturity, cash flows are stable and assets are plentiful, so lenders compete to lend, and the cost of debt is at its lowest.
- With fewer good projects left to invest in, the firm has spare cash.
- Taking on debt to pay it out as dividends or buybacks is common, and the tax shield adds to the appeal.
- Then comes decline.
- Sales and profits fall, but the debt is still there.
- The same fixed interest now sits on a smaller profit, so the danger rises, even though the firm has borrowed nothing new.
- Lenders see it, raise the price of new loans, or refuse them.
- So a declining firm typically repays debt and sells assets.

16 Example 3: the same debt, shrinking profit

Debt $400 at 6%; interest cover = operating profit ÷ interest

Interest bill each year	6% × 400	**$24**
Maturity: profit $100	100 ÷ 24	**4.17×**
Decline: profit $40	40 ÷ 24	**1.67×**
Break-even: profit $24	24 ÷ 24	**1.00×**

IN THE LESSON

- A number makes this vivid.
- A company has debt of four hundred dollars at six per cent, so the interest bill is twenty four dollars a year.
- Use interest cover, which is operating profit divided by interest.
- At maturity, operating profit is one hundred dollars.
- One hundred divided by twenty four is about four point one seven times.
- Comfortable.
- In decline, profit falls to forty, with the same debt.
- Forty divided by twenty four is about one point six seven times.
- The firm still pays, but a small further fall pushes it into trouble.
- If profit dropped to twenty four, cover would be exactly one, and nothing would be left for owners.
- Nothing was borrowed, yet the risk rose.

17 A pizza and the first big idea

- Value comes from the business's cash flows
- Splitting them into debt and equity adds nothing
- Perfect world: no taxes, no distress costs
- Result: the mix does not matter

IN THE LESSON

- Now to the famous pair of ideas.
- Two professors, Modigliani and Miller, asked a simple question.
- Does the mix of debt and equity change what a company is worth?
- Imagine a pizza.
- You can cut it into four big slices or eight small ones.
- The pizza is the same size.
- Cutting differently does not make more pizza.
- Their claim was that a company is the same.
- Its value comes from the cash its business produces, and how that cash is sliced between lenders and owners does not change the total.
- They proved it in a perfect world.
- No taxes.
- No bankruptcy costs.
- No information gaps.
- People can borrow on the same terms as companies.
- In that world, the mix is irrelevant.

18 Proposition I with no taxes

V(levered) = V(unlevered)

Levered value	Firm value when it uses debt and equity
Unlevered value	Firm value when owners fund everything

IN THE LESSON

- Here is the first proposition, with no taxes.
- The value of a levered company equals the value of an unlevered company.
- Levered just means it uses debt.
- Unlevered means it has no debt.
- Two companies with the same business, one with debt and one without, are worth the same.
- Why?
- Suppose the levered one were worth more.
- An investor could buy the cheaper, unlevered company and borrow personally, copying the levered company's position at a lower price.
- This do-it-yourself borrowing is called homemade leverage, and it pulls the prices together.
- So a company cannot add value merely by changing its mix.
- Remember that this holds only without taxes and distress costs.

19 Proposition II with no taxes

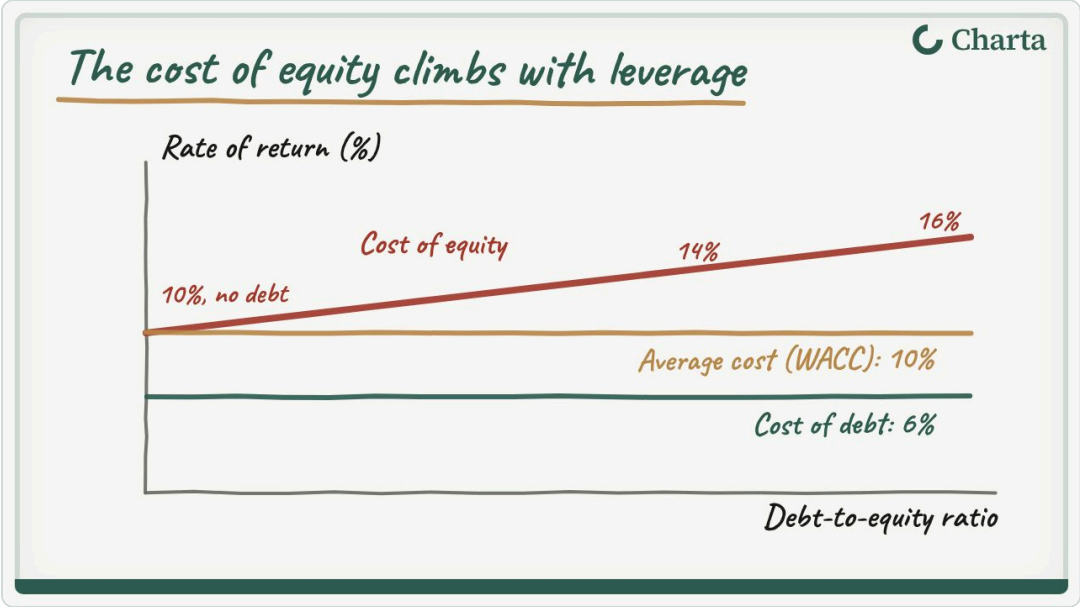
re = r0 + (r0 − rd) × (D/E)

re: cost of equity	Return the owners demand
r0: no-debt cost	Cost of capital with no debt
rd: cost of debt	Interest rate on the debt
D/E: debt-to-equity	Debt divided by equity

IN THE LESSON

- The second proposition is about the cost of equity.
- In the formula, R E is the cost of equity, the return owners demand.
- R zero is the cost of capital with no debt.
- R D is the cost of debt, the interest rate.
- D over E is the debt-to-equity ratio.
- Debt is cheaper than equity, so you might think more debt lowers the average cost of funding.
- Modigliani and Miller said no.
- As the company borrows more, its equity becomes riskier, because the owners are paid last and the swings get bigger, as we saw earlier.
- So owners demand a higher return.
- The formula says R E equals R zero, plus a premium.
- The premium is R zero minus R D, multiplied by D over E.
- More debt per dollar of equity, higher cost of equity.
- The rise exactly offsets the cheaper debt.

20 The cost of equity climbs with leverage



IN THE LESSON

- Here is the second proposition drawn.
- Along the bottom is the debt-to-equity ratio, from zero to one and a half.
- Up the side is the rate of return.
- The low flat line is the cost of debt, six per cent, which we assume stays constant.
- The rising line is the cost of equity.
- It starts at ten per cent when there is no debt, and climbs steadily.
- At a ratio of one it reaches fourteen per cent, and at one and a half, sixteen.
- The middle flat line is the weighted average cost of capital, the blend of the two costs, and it stays at ten per cent all the way.
- Cheap debt is exactly cancelled by dearer equity.

21 Example 4: the no-tax world in numbers

Cash flow $100 a year forever; r0 = 10%; borrow $400 at 6%

Value with no debt	100 ÷ 10%	**$1,000**
Value with the debt	same, V(L) = V(U)	**$1,000**
Equity left	1,000 − 400	**$600**
Cost of equity	10 + 4 × 400/600	**12.67%**
Average cost (WACC)	0.6 × 12.67 + 0.4 × 6	**10.00%**

IN THE LESSON

- Let's check it with round numbers.
- A company produces one hundred dollars of cash a year forever, and investors demand ten per cent from an all-equity firm.
- Its value is one hundred divided by point one, which is one thousand dollars.
- Now it borrows four hundred dollars at six per cent.
- Proposition I says the total value stays at one thousand, so equity is six hundred.
- Interest is twenty four, so owners get seventy six dollars a year.
- Seventy six divided by six hundred is twelve point six seven per cent.
- The formula agrees.
- Ten plus four times four over six is twelve point six seven.
- Finally, the blended cost is sixty per cent times twelve point six seven, plus forty per cent times six.
- That is exactly ten per cent.
- Nothing changed.

22 Proposition I with taxes

V(levered) = V(unlevered) + t × D

Levered value	Firm value when it uses debt
Unlevered value	Firm value with no debt, after tax
Tax shield	Tax rate times permanent debt

IN THE LESSON

- Now let's add corporate tax, which breaks the spell.
- Because interest is deductible, borrowing creates the tax shield we met.
- Proposition I with taxes says the value of the levered company equals the value of the unlevered company, plus the tax rate times the debt.
- That last term is the present value of all the future tax shields, assuming the debt is permanent.
- Why is it the rate times the debt?
- Each year, the tax saved is the rate times the interest.
- If the debt is forever, discounting those savings at the cost of debt gives exactly the tax rate times the debt.
- Every dollar borrowed adds value equal to the tax rate.
- So debt now matters.

23 Proposition II with taxes

re = r0 + (r0 − rd) × (1 − t) × (D/E)

re: cost of equity	Return the owners demand
r0: no-debt cost	Cost of capital with no debt
rd: cost of debt	Interest rate on the debt
Tax rate	Corporate tax rate
D/E: debt-to-equity	Debt divided by equity

IN THE LESSON

- The cost of equity formula changes slightly.
- It is the cost with no debt, plus the gap between the cost with no debt and the cost of debt, times one minus the tax rate, times the debt-to-equity ratio.
- The extra bracket, one minus the tax rate, means equity becomes riskier more slowly, because the government shares the interest bill by giving back the shield.
- The blended cost behaves differently too.
- It now falls as debt rises, because each dollar of debt brings a shield.
- So with taxes, the average cost of capital drops steadily, and the firm is worth more and more.
- Taken literally, this says a company should be almost all debt.
- That is the puzzle.

24 Example 5: the same idea with tax

Profit $160, tax 25%, r0 = 10%, borrow $400 at 6%

After-tax profit	160 × (1 − 25%)	**$120**
Value with no debt	120 ÷ 10%	**$1,200**
Tax shield, so value 1,300	25% × 400	**$100**
Cost of equity (E = 900)	10 + 4 × 0.75 × 400/900	**11.33%**
Average cost (WACC)	120 ÷ 1,300	**9.23%**

IN THE LESSON

- Let's redo the example with tax.
- The company earns one hundred and sixty dollars before tax, and the tax rate is twenty five per cent, so one hundred and sixty times one minus twenty five per cent leaves one hundred and twenty after tax.
- At ten per cent, the unlevered value is one hundred and twenty divided by point one, or twelve hundred dollars.
- Now it borrows four hundred at six per cent.
- The shield is twenty five per cent of four hundred, which is one hundred.
- So the levered value is thirteen hundred.
- Equity is thirteen hundred minus four hundred, which is nine hundred.
- The cost of equity is ten plus four times point seven five times four over nine, which is eleven point three three per cent.
- And the blended cost is one hundred and twenty over thirteen hundred, or nine point two three per cent, below ten.

25 Example 6: valuing the tax shield

Debt $400 at 6%, permanent; tax rate 25%

Interest each year	6% × 400	**$24**
Tax saved each year	25% × 24	**$6**
Present value of the shield	6 ÷ 6%	**$100**
Shortcut: rate × debt	25% × 400	**$100**

IN THE LESSON

- One more look at where the one hundred comes from.
- The firm pays interest of twenty four dollars each year, which is six per cent of four hundred.
- Twenty five per cent of twenty four is six dollars of tax saved every year.
- Now, if the debt is permanent, that six dollars is a perpetuity, a payment that goes on forever.
- The value of a perpetuity is the payment divided by the rate.
- Six divided by point zero six is one hundred dollars.
- We discount at six per cent, because the shield is about as safe as the interest itself.
- And one hundred is exactly the tax rate times the debt.
- If the tax rate were forty per cent instead, the shield would be one hundred and sixty.
- The shield grows with the tax rate and with debt.

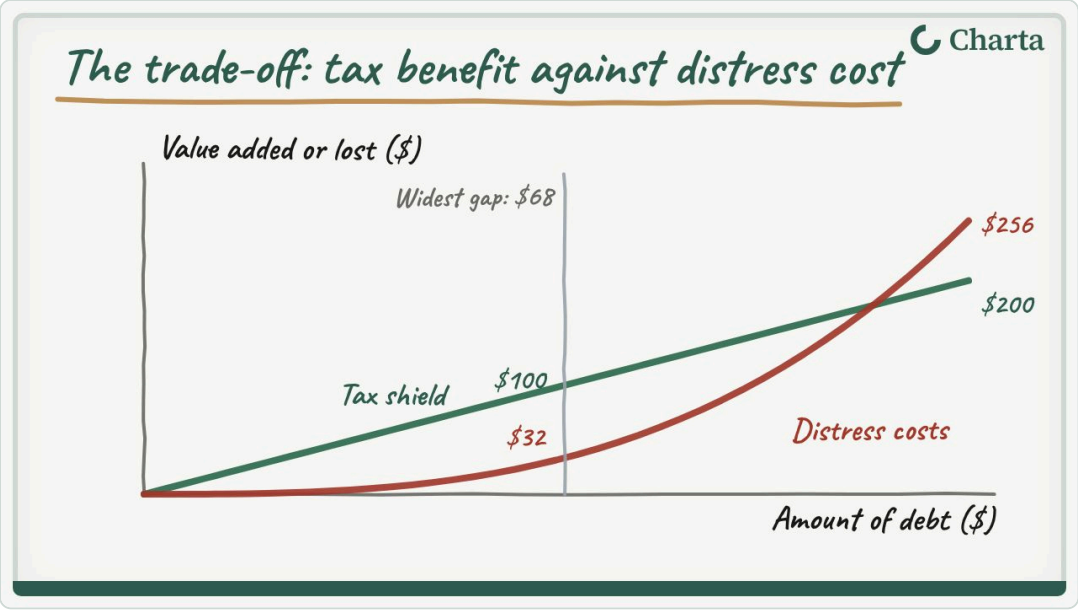
26 Four mistakes to avoid so far

- 1. More debt always cuts the average cost: only with tax
- 2. Shield = rate × debt, not rate × interest
- 3. Pecking order is an order, not a target ratio
- 4. Life stage suggests capacity, it is not a rule

IN THE LESSON

- Before the last idea, four mistakes that cost marks.
- One.
- Saying debt is cheaper, so more debt always lowers the average cost.
- Without taxes, equity gets dearer by exactly enough, and the average cost stays put.
- Two.
- Forgetting that the tax shield formula assumes permanent debt, and that the value is the tax rate times the debt, not times the interest.
- Three.
- Treating the pecking order as a target mix.
- It describes the order of choices, and managers following it do not aim for a ratio.
- Four.
- Believing the life cycle is automatic.
- A mature firm could use little debt, and a declining firm could carry too much.
- Stage suggests debt capacity, not a rule.

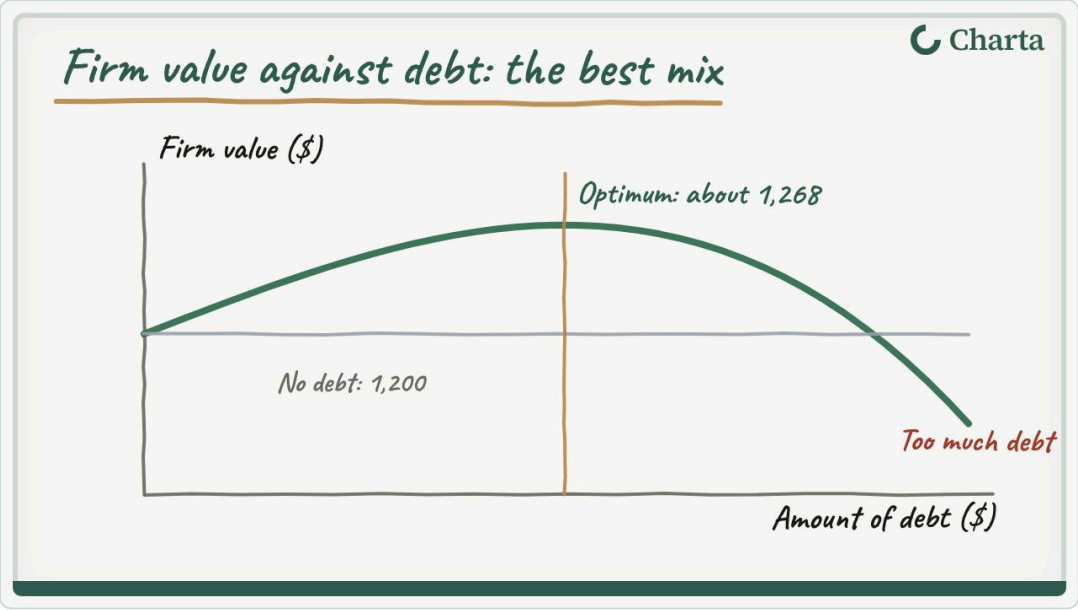
27 The trade-off: tax benefit against distress cost



IN THE LESSON

- Now the last idea, which fixes the puzzle.
- Real companies are not all debt, because distress is costly.
- Here are the two effects as a picture.
- Along the bottom is the amount of debt, from zero to eight hundred dollars.
- Up the side is the value added or lost, in dollars.
- The straight line is the tax shield, twenty five cents for each dollar borrowed.
- It rises steadily.
- The curved line is the present value of expected distress costs.
- It starts almost flat, because a little debt is very safe, and then bends sharply upward as debt grows.
- The best amount of debt is where the gap between the lines is widest, near four hundred dollars.
- There the shield is one hundred and the distress cost about thirty two, a gap of sixty eight.
- At eight hundred, the shield is two hundred but distress costs are two hundred and fifty six.
- Back at four hundred, the extra shield from one more dollar just equals the extra distress cost.

28 Firm value against debt: the best mix



IN THE LESSON

- Now the same thing as one curve: the value of the firm.
- Debt is along the bottom, and firm value is up the side.
- The flat line is the unlevered value, twelve hundred dollars, the starting point with no debt.
- Now follow the curve.
- At first it rises, because each dollar of debt brings a shield and distress costs are tiny.
- It reaches a peak of about twelve hundred and sixty eight dollars near four hundred of debt.
- Past that point, distress costs grow faster than the shield, and the curve turns down.
- At eight hundred, the firm is worth less than if it had no debt at all.
- The top of the hill is the optimal capital structure, the mix that gives the highest firm value and the lowest average cost of capital.

29 The trade-off theory in one line

V(levered) = V(unlevered) + PV(tax shield) − PV(distress costs)

Levered value	Firm value with debt
Unlevered value	Firm value with no debt
Tax shield	Benefit of borrowing
Distress costs	Cost of borrowing too much

IN THE LESSON

- Here is the whole idea in one line, called the static trade-off theory.
- The value of the levered company equals the value of the unlevered company, plus the present value of the tax shield, minus the present value of the costs of financial distress.
- Three pieces.
- The first is what the business is worth with no debt.
- The second is the benefit of borrowing.
- The third is the price of borrowing too much, which includes lost customers and legal fees, weighted by how likely trouble is.
- Static means we look at one balance of the two at a time.
- The optimum is where the extra tax benefit of one more dollar of debt equals the extra expected distress cost.

30 Example 7: finding the best amount of debt

Value = 1,200 + shield − distress costs

Debt $0	no shield, no distress	**$1,200**
Debt $200	shield 50, distress 4	**$1,246**
Debt $400	shield 100, distress 32	**$1,268**
Debt $600	shield 150, distress 108	**$1,242**
Debt $800	shield 200, distress 256	**$1,144**

IN THE LESSON

- Let's compute the picture.
- Take the unlevered value of twelve hundred dollars.
- At two hundred of debt, the shield is fifty, and distress costs are four, so value is twelve forty six.
- At four hundred, the shield is one hundred, distress costs are thirty two, and value is twelve sixty eight, the highest.
- At six hundred, the shield is one hundred and fifty, but distress costs jump to one hundred and eight, so value drops to twelve forty two.
- At eight hundred, the shield is two hundred, but distress costs are two hundred and fifty six, so value falls to eleven forty four.
- The best debt is four hundred.
- As a share of the firm's value, that is about thirty two per cent debt.

31 Target and optimal: a range that moves

- Optimal: highest value, lowest average cost
- Target: the mix management aims to keep
- Near the top the curve is flat: a range
- It moves with taxes, risk, stage and markets

IN THE LESSON

- Two terms to keep apart.
- The optimal capital structure is the mix, in theory, that maximises firm value and minimises the average cost of capital.
- The target capital structure is the mix management actually aims for over time, written as debt divided by total capital.
- The two are related, but the target is a practical plan.
- Notice the top of our curve is rather flat.
- Debt between three hundred and five hundred gives nearly the same value.
- So a sensible target is a range, not a point.
- And the range moves.
- If the tax rate falls, the shield shrinks and the best debt falls.
- If the business becomes riskier, distress costs rise sooner.
- Actual weights also drift as share prices move and money is raised in lumps.
- Outside analysts often use the current market weights or peers.

32 Recap: four ideas to remember

- 1. Business risk, tax, distress, agency, information
- 2. Debt capacity: none, some, peak, shrinking
- 3. MM: no tax, mix irrelevant; with tax, V + tD
- 4. Trade-off: optimum where shield equals distress

IN THE LESSON

- Let's pull it together.
- One.
- The mix is shaped by five forces.
- Business risk and distress costs hold debt back, the tax shield pulls it forward, and agency costs and information gaps work in both directions.
- Two.
- As companies age, debt capacity rises from nothing at the start-up, peaks at maturity and then is cut back in decline.
- Three.
- In a perfect world, the mix does not matter, and the cost of equity rises to offset the cheap debt.
- With taxes, value rises by the tax rate times the debt.
- Four.
- Real firms balance the shield against distress costs, aim at a target range around the optimum, and adjust it when conditions change.

33 Try three quick questions

1. All-equity value $2,000, tax rate 30%, permanent debt of $500. Levered value?
   Answer: $2,150 = 2,000 + 30% × 500
2. No taxes: the firm borrows more. Cost of equity and average cost?
   Answer: Equity cost rises; average cost unchanged.
3. An extra $1 of debt adds 40c of shield and 60c of distress cost. Do what?
   Answer: Borrow less: the cost beats the benefit.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A company with no debt is worth two thousand dollars.
- The tax rate is thirty per cent, and it borrows five hundred dollars permanently.
- What is its value according to Modigliani and Miller with taxes?
- Two thousand plus thirty per cent of five hundred, which is two thousand one hundred and fifty.
- Question two.
- With no taxes, a company raises more debt.
- What happens to its cost of equity and its average cost of capital?
- The cost of equity rises, and the average cost stays the same.
- Question three.
- An extra dollar of debt would add forty cents of tax shield and sixty cents of distress costs.
- What should the firm do?
- Borrow less.
- Well done.