Key terms: markets and private investments

Key terminology

1 How to use these terms

- Trading: how shares are sold, priced and borrowed
- Ownership: residual claim and cumulative voting
- Patterns: momentum and index reconstitution
- Valuing: enterprise value, NAV and appraisal
- Private funds, then tokens and custody

IN THE LESSON

- Think of this lesson as a phrase book for a foreign city.
- A few key phrases make everything easier.
- We go in six steps.
- First, how shares are sold and traded: the primary market, the secondary market, public offerings, underwriters, price discovery, liquidity, lock ups, short selling and marking to market.
- Second, two ideas about ownership: the residual claim and cumulative voting.
- Third, two patterns in prices: momentum and index reconstitution.
- Fourth, how firms and funds are valued: enterprise value, net asset value and appraisal.
- Fifth, private funds.
- Last, two modern ideas, tokens and custody.
- Pause and rewind whenever you like.

2 Primary market and secondary market

Primary market: new securities

Company issues new shares → Investors pay the company → Company gets the cash

Secondary market: existing securities

Investor sells old shares → Another investor pays → Issuer gets nothing

IN THE LESSON

- Start with a village market.
- A farmer who grows new apples sells them to shoppers and takes the money home.
- Later, a shopper who no longer wants their apples sells them to a neighbour, and the farmer sees none of that money.
- The first is the primary market.
- It is where a company sells newly issued securities and receives the cash.
- The second is the secondary market.
- It is where investors trade existing securities among themselves, and the issuer receives nothing.
- Why does that matter to the company?
- Because buyers pay more for a new share when they know they can sell it later.
- You will meet both in Equity Investments and Fixed Income, since bonds are also issued once and traded afterwards.

3 Initial public offering and underwriter

Halcyon Kitchenware: 10m new shares at $20

Shares sold in the IPO	10m × $20	**$200m**
Underwriter's spread	5% × 200	**$10m**
Cash to the company	200 − 10	**$190m**
Founders still hold	30m of 40m shares	**75%**

IN THE LESSON

- Think of a baker opening a stall for the first time.
- They hire an organiser who guesses how many people will come, and fixes the prices.
- A company's first sale of shares to the public is an initial public offering, or I P O.
- The organiser is the underwriter, a bank that manages the sale, gauges demand and sets the price, often guaranteeing the proceeds by buying the securities itself and reselling them.
- Take Halcyon Kitchenware.
- It sells ten million new shares at twenty dollars, raising two hundred million.
- The underwriter keeps a spread of five per cent, ten million, so the company receives one hundred ninety million.
- The founders still hold thirty million of forty million shares, seventy five per cent.
- You will meet this in Ethics, Corporate Issuers and Equity Investments.

4 Price discovery

Larchmont Bikes: news arrives overnight

Share closes at	the day before	**$50.00**
News is worth	+4% of 50.00	**+$2.00**
Derivative trades at	50.00 × 1.04, overnight	**$52.00**
Share opens near	the price is found	**$52.00**

IN THE LESSON

- At an auction, nobody announces what a painting is worth.
- The price appears as bidders raise their hands, until only one is left.
- That is price discovery: the process by which trading reveals what the market thinks something is worth.
- Derivatives often lead the way.
- They are cheaper to trade, and they are open when the underlying share is not.
- Here a Larchmont Bikes share closes at fifty dollars.
- Overnight, news arrives that is worth four per cent, two dollars.
- A derivative on the share trades at fifty two dollars while the share market sleeps, and the share opens near fifty two.
- The derivative showed the way.
- You will meet this in Equity Investments and Derivatives.

5 Liquidity

Spread = ask − bid, against the middle price

Osprey: bid 19.98, ask 20.02	ask − bid	**$0.04**
Osprey spread against 20.00	0.04 ÷ 20.00	**0.20%**
Saltmarsh: bid 9.70, ask 10.30	ask − bid	**$0.60**
Saltmarsh spread against 10.00	0.60 ÷ 10.00	**6.00%**
Round trip, 10,000 shares	Osprey v Saltmarsh	**$400 v $6,000**

IN THE LESSON

- Selling a house takes weeks.
- Handing in a banknote takes a second.
- The difference is liquidity: how quickly something can be turned into cash without moving its price.
- A good clue is the bid ask spread, the gap between the highest price a buyer offers and the lowest price a seller asks.
- Look at two made up shares.
- Osprey Tools has a bid of nineteen ninety eight and an ask of twenty oh two, a gap of four cents, two tenths of one per cent.
- Saltmarsh Mills has a bid of nine seventy and an ask of ten thirty, a gap of sixty cents, six per cent.
- Buy and sell ten thousand shares straight back, and the round trip costs four hundred dollars in Osprey and six thousand in Saltmarsh.
- Liquidity is scarce exactly when it is most wanted.
- You will meet it in nearly every topic.

6 Lock-up

Osprey IPO: insiders locked up for 180 days

Shares in issue		**50m**
Locked up by insiders		**15m**
Free to trade	50 − 15	**35m (70%)**
Normal trading per day		**0.5m**
Days to absorb the 15m	15 ÷ 0.5	**30 days**

IN THE LESSON

- A lock up is a period during which capital cannot be withdrawn from a fund, or shares held by insiders cannot be sold.
- After an I P O, insiders usually promise not to sell for a set time.
- Osprey Tools lists fifty million shares, and insiders hold fifteen million of them under a lock up of one hundred eighty days.
- So only thirty five million shares are free to trade, seventy per cent.
- When the lock up ends, fifteen million shares could reach the market.
- At half a million shares a day, that is thirty days of trading.
- For a fund investor the lock up is the constraint an illiquidity premium is meant to pay for.
- You will meet it in Quantitative Methods, Equity and Alternatives.

7 Short selling

Ashgrove Motors: short 100 shares at $50

Sell the borrowed shares	100 × $50	**+$5,000**
Buy back after a fall to $40	100 × $40	**−$4,000**
Dividend owed to the lender	100 × $1	**−$100**
Profit if the price falls	5,000 − 4,000 − 100	**$900**
Result if it rises to $65	5,000 − 6,500 − 100	**−$1,600**

IN THE LESSON

- Lend a friend your bicycle.
- They sell it, and promise to buy one back later and return it.
- If bicycles get cheaper, they keep the difference.
- Short selling works the same way: you borrow a security, sell it, and later buy it back to return, so as to profit from a fall.
- Borrow a hundred shares of Ashgrove Motors at fifty dollars and sell them for five thousand.
- The price falls to forty.
- You buy back for four thousand and keep a thousand.
- The shares paid a dividend of one dollar each meanwhile, which you owe the lender, a hundred dollars, so the profit is nine hundred.
- Had the price risen to sixty five, buying back would cost six thousand five hundred, and you would lose sixteen hundred.
- You will meet this in Quantitative Methods, Equity, Derivatives, Alternatives and Portfolio Management.

8 Short selling: the gain is capped

Chart: Profit ($) on 100 shares sold at $50 vs Buy-back price ($)

- Price to 0: +5,000
- Break-even at $50
- At $100: −5,000

IN THE LESSON

- Here is the picture.
- Along the bottom is the price at which you buy the shares back, from zero to one hundred dollars.
- Up the side is your profit in dollars, on the hundred shares sold at fifty.
- Follow the line from the left.
- If the price drops all the way to zero, you keep the full five thousand you received.
- That is the most you can ever make.
- The line crosses zero at fifty, where you break even.
- To the right, the price keeps rising and the line keeps falling.
- At one hundred dollars you have lost five thousand, and nothing stops the price going higher still.
- A gain that is capped and a loss that is not is why short selling is risky.

9 Marked to market

Long 100 futures units, bought at $50

Day 1 close $52	up 2 × 100	**+$200**
Day 2 close $51	down 1 × 100	**−$100**
Day 3 close $55	up 4 × 100	**+$400**
Cash settled in total	200 − 100 + 400	**+$500**
Check: whole rise	100 × (55 − 50)	**$500**

IN THE LESSON

- A futures contract works like a cafe tab settled every evening.
- Marked to market means revalued at the current market price, and for a futures position the gain or loss is settled in cash each day.
- Because of this, the credit exposure between the two sides never grows beyond a single day's move.
- Suppose you hold a long position in a hundred units, bought at fifty.
- At the end of day one the price is fifty two, so you receive two hundred dollars.
- On day two it is fifty one, and you pay one hundred.
- On day three it is fifty five, and you receive four hundred.
- In all you have received five hundred, exactly a hundred times the five dollar rise.
- You will meet this in Equity Investments and Derivatives.

10 Residual claim

Beacon Bottling: value 100, lenders owed 60

Owners' residual claim	100 − 60	**40**
Value falls 10% to 90	owners: 90 − 60 = 30	**−25%**
Value rises 20% to 120	owners: 120 − 60 = 60	**+50%**
Value falls to 55	owners 0; lenders short 5	**0**

IN THE LESSON

- At a family dinner the guests eat first, and the cook eats what remains.
- Shareholders are the cook.
- A residual claim is the right to whatever is left of earnings and assets after every prior claim has been met.
- It carries all the upside, and is paid last and only if something remains.
- Take Beacon Bottling, worth a hundred and owing its lenders sixty.
- The owners' claim is the remaining forty.
- If the firm's value falls ten per cent to ninety, the owners hold thirty, a fall of a quarter.
- If it rises twenty per cent to one hundred twenty, the owners hold sixty, a rise of half.
- And if it falls to fifty five, the owners get nothing, and the lenders are short by five.
- You will meet this in Corporate Issuers, Equity and Fixed Income.

11 Cumulative voting

Yarrow Optics: 4 seats, 100 shares (70 and 30)

Straight voting, small holder	loses every seat 70 to 30	**0 seats**
Small holder's cumulative votes	30 × 4 seats	**120**
Large holder's cumulative votes	70 × 4 seats	**280**
Large holder needs, to win all 4	more than 4 × 120	**over 480**
Small holder, all on one	cannot be beaten	**1 seat**

IN THE LESSON

- Picture a club electing four committee members, with seventy members on one side and thirty on the other.
- If every seat is a separate vote, the thirty never win.
- Cumulative voting changes the counting.
- Shareholders may cast all their votes, one per share for each seat, for a single candidate.
- It helps a minority elect some of the board, which straight voting would prevent.
- Yarrow Optics has one hundred shares and four seats.
- The small holder, with thirty shares, gets thirty votes for each of four seats, one hundred twenty votes, and puts them all on one candidate.
- The large holder has two hundred eighty votes.
- To beat one hundred twenty on all four seats, it would need more than four hundred eighty.
- It cannot, so the small holder wins a seat.
- You will meet this in Corporate Issuers and Equity Investments.

12 Momentum

Made-up illustration, not market data

Past year, winners	average return	**+40%**
Past year, losers	average return	**−25%**
Next 3 months, winners	average return	**+5%**
Next 3 months, losers	average return	**+1%**
Buy winners, short losers	5 − 1	**+4 points**

IN THE LESSON

- A busy restaurant looks good, so more people go in.
- Momentum is the tendency of recent winners to keep outperforming, and recent losers to keep lagging, over the following months.
- Here is a made up picture, not real data.
- Rank shares on their last year.
- The top group returned forty per cent, and the bottom group lost twenty five.
- Over the next three months the winners return five per cent and the losers one.
- A fund that buys winners and sells losers short earns the gap, four points.
- Why would it persist?
- One explanation is underreaction and herding: news is absorbed slowly, then a crowd chases the trend.
- The rival explanation is that it pays for a risk nobody has named yet.
- You will meet this in Ethics, Equity Investments and Portfolio Management.

13 Reconstitution

Pelham Gear is added to an index

Index funds must buy	on the effective date	**3m shares**
Price at announcement		**$40**
Price at effective date		**$42**
Rise in price	2 ÷ 40	**5.0%**
Extra cost to the funds	3m × $2	**$6m**

IN THE LESSON

- Reconstitution is changing which securities belong to an index, adding and removing members under its rules.
- Rebalancing only resets the weights of existing members.
- Index funds must copy the change, and the dates are known in advance, so others trade ahead of them and the index funds pay for it.
- Say Pelham Gear is to be added to an index.
- At the announcement it trades at forty dollars.
- Index funds must buy three million shares on the effective date, by which time the price is forty two, five per cent higher.
- They pay two dollars extra on three million shares, six million dollars.
- Careful: in Fixed Income, reconstitution means rebuilding a bond from its stripped payments.
- You will meet this one in Equity Investments.

14 Mistakes and look-alikes

- Primary: firm gets cash. Secondary: it gets none
- Reconstitution: who is in. Rebalancing: the weights
- Short selling: the gain is capped, the loss is not
- Marked to market: futures settle in cash every day
- Residual claim: paid last, but keeps all the upside

IN THE LESSON

- Time to separate the look alikes.
- First, primary and secondary markets.
- In the primary market the company receives the cash.
- In the secondary market investors swap securities and the company receives nothing.
- Second, rebalancing and reconstitution.
- Rebalancing resets the weights, while reconstitution changes who is in the index.
- Third, short selling.
- The most you can make is the whole price, but the loss has no ceiling.
- Fourth, marked to market.
- For a futures position it means cash settles every day, not only at the end.
- Fifth, a residual claim is paid last, but it also keeps every dollar of the upside.
- Say each pair aloud to yourself, and the confusion fades.

15 Enterprise value

EV = Equity + Debt + Preferred − Cash

Equity value	Market value of the shares
Debt	Owed to lenders
Preferred stock	Paid before the shares
Cash	Cash and investments held
Enterprise value	Whole firm, all providers

IN THE LESSON

- Buying a house with a mortgage costs more than its price, and money left in a drawer reduces the cost.
- Enterprise value is the value of the whole firm to all its capital providers.
- Take the market value of the equity, add debt and preferred stock, and subtract cash and investments.
- Debt and preferred stock are added because whoever buys the firm takes them on.
- Cash is subtracted because it can pay some of that down.
- The result is set against pre interest measures such as E B I T D A, which means earnings before interest, tax, depreciation and amortisation, so that firms financed differently can be compared.
- You will meet this in Equity Investments and Alternative Investments.

16 Example: Stanhope Printing

Stanhope Printing: 40m shares at $25

Equity value	40m × $25	**$1,000m**
Add debt and preferred	400 + 100	**+$500m**
Take off cash		**−$150m**
Enterprise value	1,000 + 500 − 150	**$1,350m**
EV ÷ EBITDA of 200	1,350 ÷ 200	**6.75x**

IN THE LESSON

- Let us build one.
- Stanhope Printing has forty million shares at twenty five dollars, so its equity is worth one thousand million.
- It owes four hundred million to lenders and has preferred stock of one hundred million.
- Together that adds five hundred million.
- It also holds cash of one hundred fifty million, which comes off.
- Enterprise value is one thousand three hundred fifty million.
- Its E B I T D A is two hundred million, so enterprise value is six point seven five times E B I T D A.
- Because the multiple ignores how the firm is financed, firms with different debt can be compared fairly.

17 Net asset value (NAV)

NAV per share = (Assets − Liabilities) ÷ Shares

Assets	Market value of holdings
Liabilities	Debts and other claims
Shares	Shares or units in issue
NAV per share	Value of one share

IN THE LESSON

- A stall's worth is what it owns minus what it owes.
- Net asset value is assets less liabilities, per share or unit.
- For a fund, add up the market value of everything it holds, subtract what it owes, and divide by the number of shares.
- An open end fund creates and redeems its shares at that value, so you deal at net asset value.
- Shares traded on an exchange, such as a closed end fund's, are priced by buyers and sellers, so they can sit at a premium or a discount to net asset value.
- You will meet it in Equity Investments, Alternative Investments and Portfolio Management.

18 Example: Mapleton Property Fund

Mapleton Property Fund: 20m shares

Assets	buildings and cash	**$520m**
Liabilities	owed to lenders	**$120m**
Net asset value	520 − 120	**$400m**
NAV per share	400 ÷ 20m shares	**$20.00**
Exchange price $17	17 ÷ 20 − 1	**−15%**

IN THE LESSON

- Mapleton Property Fund holds buildings and cash worth five hundred twenty million dollars, and owes one hundred twenty million.
- Net asset value is four hundred million.
- With twenty million shares, that is twenty dollars a share.
- An investor in an open end fund can buy or sell at exactly twenty.
- Now suppose Mapleton is a closed end fund whose shares trade on an exchange at seventeen dollars.
- Seventeen over twenty is eighty five per cent, so the shares sit at a fifteen per cent discount.
- The buyer gets twenty dollars of assets for seventeen, but only if the discount closes, and it may stay open for years.
- In a property fund the asset values are often appraisals, our next term.

19 Appraisal

True value 100, 80, 80, 100. Appraiser moves halfway

Year 1: market 80	100 + 0.5 × (80 − 100)	**90.0**
Year 2: market 80	90 + 0.5 × (80 − 90)	**85.0**
Year 3: market 100	85 + 0.5 × (100 − 85)	**92.5**
True return swing	−20% to +25%	**45 points**
Reported swing	−10.0% to +8.8%	**18.8 points**

IN THE LESSON

- An agent values your house from what the neighbours' houses fetched.
- That is appraisal: valuing an asset by expert estimate, usually from comparable transactions, rather than by an observed trade.
- Property and private funds are valued this way.
- The catch is that appraised values lag the market and smooth the true series.
- Suppose a building's true value runs one hundred, eighty, eighty, one hundred.
- The appraiser moves halfway to the latest market value each year.
- Year one: ninety.
- Year two: eighty five.
- Year three: ninety two and a half.
- The true returns swing from a loss of twenty to a gain of twenty five, forty five points.
- The reported swing is from a loss of ten to a gain of eight point eight, eighteen point eight points.
- Volatility is understated.
- You will meet this in Equity and Alternative Investments.

20 Appraisal smooths the picture

Chart: Value (starts at 100) vs Year (0 to 3)

- Market 80
- Appraised: 90, 85, 92.5
- Market 100

IN THE LESSON

- Here is the same building drawn.
- Along the bottom are the years, zero to three.
- Up the side is the value, starting from one hundred.
- The red line is the true market value.
- It falls to eighty in year one, stays at eighty, then jumps back to one hundred in year three.
- The green line is the appraised value.
- It drifts down more gently to ninety, then eighty five, and only reaches ninety two and a half at the end.
- The green line understates both the fall and the recovery, so volatility looks lower than it truly is.
- Correlation with other assets looks lower too, which flatters measures such as the Sharpe ratio.
- A careful analyst treats reported risk for appraised assets as a floor, not a fact.

21 General partner and limited partner

- General partner (GP): runs the business, fully liable
- In a private fund the GP is the manager: finds, runs, exits
- Limited partner (LP): loss capped at what it contributed
- In a private fund the LP is the investor, with no say

IN THE LESSON

- A fishing boat has a skipper and backers.
- The skipper steers and answers for everything that goes wrong.
- The backers pay for the boat and stay ashore.
- In a limited partnership the skipper is the general partner.
- It runs the business and bears general partner liability, often through a limited liability entity.
- In a private fund it is the manager: it finds, runs and exits the investments and calls capital.
- The backers are the limited partners.
- Their liability is capped at what they contributed, in return for no part in management.
- In a private fund they are the investors, committing capital they can rarely get back before the fund ends.
- You will meet these in Financial Statement Analysis, Corporate Issuers, Equity and Alternatives.

22 How far a limited partner can lose

Corvin Pension (LP) and Ironbridge (GP)

Commitment	promised by the LP	**$40m**
Called so far	paid in	**$15m**
Not yet called	40 − 15	**$25m**
Worst loss for the LP	15 + 25	**$40m**
Debts above $40m fall on	no cap	**General partner**

IN THE LESSON

- Corvin Pension commits forty million dollars to a fund run by Ironbridge Capital Partners.
- So far the general partner has called fifteen million, which has been paid in and invested.
- Twenty five million remains uncalled, and Corvin must keep it ready.
- Now suppose the fund fails and owes creditors far more than it holds.
- The most Corvin can lose is the fifteen already paid in, plus the twenty five it can still be called for, forty million, its commitment, and no more.
- Anything above that falls on the general partner, whose liability is not capped.
- That is the bargain.
- The limited partner takes capped risk and no say, while the general partner takes unlimited risk and all the control.

23 Management fee

Ironbridge fund: $500m committed, 2% fee

Fee on commitments	2% × 500	**$10m a year**
A losing year	the fee is still due	**$10m**
Over a 5 year period	5 × 10	**$50m**
Left to invest	500 − 50	**$450m**
If the fund were 700	2% × 700	**$14m a year**

IN THE LESSON

- A gym charges a fee whether you turn up or not.
- A management fee is like that: a fee charged as a percentage of committed or invested capital, or of assets, whatever the returns.
- It pays for running the fund.
- The Ironbridge fund has five hundred million dollars committed and charges two per cent on commitments.
- That is ten million a year, in good years and bad.
- Over a five year investment period it comes to fifty million, so only four hundred fifty million is left to invest.
- If the manager raised a bigger fund of seven hundred million, the same two per cent would be fourteen million a year.
- A large fee can reward gathering assets more than performing.
- You will meet this in Ethics, Quantitative Methods and Alternatives.

24 Waterfall

140 returned on 100: 8% preferred, full catch-up, 20% carry

1. Capital back to the LPs		**100**
2. Preferred return to LPs	8% × 100	**8**
3. Catch-up to the GP	20% × 8 ÷ 80%	**2**
4. Split the rest 80/20	140 − 100 − 8 − 2 = 30	**LP 24, GP 6**
GP's total share	2 + 6 = 20% of 40	**8**

IN THE LESSON

- A waterfall is the order in which cash is paid out or losses absorbed.
- In a private fund: capital back first, then a preferred return, a catch up and the profit split.
- Say a fund returns one hundred forty after one year on one hundred invested.
- Step one, the first hundred goes back to the limited partners.
- Step two, a preferred return of eight per cent: eight more to the limited partners.
- Step three, the catch up: the general partner takes the next dollars until it holds twenty per cent of the profit so far, which is two.
- Step four, the remaining thirty is split eighty twenty: twenty four to the limited partners and six to the general partner.
- The general partner ends with eight, twenty per cent of the forty profit.
- In a securitisation, senior tranches are paid first.
- You will meet this in Alternatives and Financial Statement Analysis.

25 J-curve

Fund calls $25m a year, then sells from year 5

Called, years 1 to 4	4 × 25	**−$100m**
Returned, years 5 to 8	30 + 50 + 60 + 40	**+$180m**
Lowest point, end of year 4	all called, none back	**−$100m**
Back to even during	cash crosses zero	**year 7**
Final profit	180 − 100	**+$80m**

IN THE LESSON

- An orchard shows a loss for years before the first apple.
- The J curve is the dip in a private equity fund's reported return in its early years.
- Fees are charged from day one and value takes years to appear, so it is negative by construction.
- Take a fund whose manager calls twenty five million a year for four years, one hundred million in all.
- The investors are down one hundred million at the end of year four, the lowest point.
- From year five the companies are sold and money returns: thirty, fifty, sixty and forty, one hundred eighty in all.
- The investors are back to even during year seven and finish eighty million ahead.
- A different J curve, in Economics, describes a currency's trade balance after a fall.
- You will meet this one in Alternatives.

26 The J-curve, drawn

Chart: Investors' net cash ($m) vs Years since the fund began

- Low: −100 at year 4
- Even in year 7
- End: +80

IN THE LESSON

- Here is the J drawn.
- Along the bottom are the years, zero to eight.
- Up the side is the investors' cumulative net cash in millions of dollars.
- The grey line is zero, where they are exactly even.
- Follow the line from the left.
- It falls every year as money is called, reaching minus one hundred at year four.
- Then sales bring cash back and the line climbs.
- It crosses zero during year seven, and finishes at plus eighty in year eight.
- The fall and the climb together draw the letter J.
- That is why a young fund is compared with other funds of the same age, not judged on its early return.

27 Leveraged buyout

Wrenfield Bakeries bought with 140 of debt

Price paid	EBITDA 25 × 8	**$200m**
Funded by	debt 140, equity 60	**70% debt**
Value up 25% to 250	equity 250 − 140 = 110	**+83.3%**
Value down 20% to 160	equity 160 − 140 = 20	**−66.7%**
Same moves, no debt		**+25% / −20%**

IN THE LESSON

- A small deposit and a large mortgage magnify gains and losses on a house.
- A leveraged buyout is the purchase of a company funded largely with debt secured on its own assets and cash flows.
- Wrenfield Bakeries earns twenty five million before interest, tax, depreciation and amortisation, and a buyer pays eight times that, two hundred million.
- The buyer funds one hundred forty with debt and sixty with its own equity.
- If the business later sells twenty five per cent higher, at two hundred fifty, the debt is still one hundred forty, so the equity is worth one hundred ten, up eighty three per cent.
- If the business falls twenty per cent to one hundred sixty, the equity is only twenty, down sixty seven per cent.
- Borrowing stretches both.
- You will meet this in Corporate Issuers, Equity, Fixed Income and Alternatives.

28 Token

Profits rose sharply in the third quarter

Words in the sentence		**7**
Tokens, one per word		**7**
Tokens in 'unprofitable'	un + profit + able	**3**
Report of 3,000 words	× 4 ÷ 3	**4,000 tokens**
Model reads at most 8,000	8,000 × 3 ÷ 4	**6,000 words**

IN THE LESSON

- When you read, you see words.
- A language model sees pieces.
- A token is the unit a language model reads and writes: a word or a piece of one.
- The model generates text by estimating probabilities for the next token, picking one and repeating.
- The sentence on the board has seven words, and if each is one token, that is seven tokens.
- A rarer word, unprofitable, may be split into three: un, profit and able.
- As a rule of thumb, there are about four tokens for every three words, so a report of three thousand words is about four thousand tokens.
- A model that can read at most eight thousand tokens at a time can take about six thousand words.
- Careful: in the digital assets topic, a token means something else, a digital claim or right held on a ledger.
- You will meet this one in Quantitative Methods and Alternatives.

29 Custody

Custody = who controls the shares or the keys

Holding	30 coins × $2,000	**$60,000**
Key lost, no backup	nothing recoverable	**$0**
Loss	60,000 − 0	**$60,000**
Share of the holding lost	60,000 ÷ 60,000	**100%**

IN THE LESSON

- Custody is safekeeping of assets on an owner's behalf.
- For shares and bonds, a custodian bank holds them in your name, kept apart from the firm that manages them.
- For digital assets it means control of the private keys, so a lost key or a hacked custodian can mean a permanent loss with no one to recover it from.
- Suppose an investor holds thirty coins worth two thousand dollars each, sixty thousand in all, and loses the only key.
- Nothing can be recovered.
- The loss is sixty thousand, all of it, whatever the price does next.
- Custody turns up in Equity Investments, Alternatives and Portfolio Management, where a custody failure is one kind of operational risk.

30 Recap: the relationships to keep

EV = Equity + Debt + Preferred − Cash
NAV = (Assets − Liabilities) ÷ Shares
Short profit = (Sell − Buy back) × Shares − dividends owed

Firm value	Compare with EBITDA
NAV per share	Open-end funds deal at it
Short profit	Gain capped, loss not
Equity return	Debt magnifies both ways
Waterfall	Capital, pref, catch-up, split

IN THE LESSON

- Let us pull it together.
- Enterprise value is equity plus debt and preferred stock, less cash, and it is set against E B I T D A.
- Net asset value per share is assets less liabilities, divided by the shares.
- A short seller makes the sale price less the buy back price, times the shares, less any dividend owed, so the gain is capped but the loss is not.
- A leveraged buyout stretches the equity return, up and down, because the lenders have a fixed claim and the owners hold the residual claim.
- And in a private fund, cash moves down the waterfall: capital back, preferred return, catch up, then the split.
- Last, in the primary market the company is paid, and in the secondary market it is not.

31 Try three quick questions

1. What does the J-curve mean?
   Answer: Early dip in reported return: fees first, value later.
2. Founder sells 5m of their own shares on the exchange. Which market? Does the firm get cash?
   Answer: Secondary market. The company receives nothing.
3. Equity 600, debt 200, cash 100, EBITDA 100. EV ÷ EBITDA?
   Answer: EV = 600 + 200 − 100 = 700, so 7.0x.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- What does the J curve mean?
- It is the dip in a private equity fund's reported return in its early years, because fees are charged from day one and value takes years to appear.
- Question two.
- A founder sells five million of their own shares to a fund through the stock exchange.
- Is that the primary or the secondary market, and does the company receive cash?
- It is the secondary market, and the company receives nothing.
- Question three.
- Equity is six hundred, debt two hundred, cash one hundred and E B I T D A is one hundred.
- What is enterprise value over E B I T D A?
- Six hundred plus two hundred minus one hundred is seven hundred, so the answer is seven times.
- Well done, and keep practising.