CHARTA LEARNING · LESSON NOTES

Capital market expectations and growth

Asset Allocation

1 A story: the sailor's chart

- Expectations: return, volatility, correlation
- One set for every asset class, one horizon
- They steer the long-term policy mix
- Tessa Marlow, Greywater Foundation (made up)

IN THE LESSON

- Picture a sailor about to cross a wide sea.
- The ship may be strong and the crew skilled, but if the chart is wrong, the voyage ends badly.
- Capital market expectations are the chart of an investor.
- They are forecasts of return, volatility and correlation for each asset class, over the horizon the client cares about.
- Strategic asset allocation, the long term mix of assets, is steered by them.
- Meet Tessa Marlow, strategist at the Greywater Foundation, a made up endowment that pays for scholarships.
- Her advisers at Northgate must supply the numbers for her next review.
- You already know these terms from earlier levels, so here we ask how good numbers are built, and how to defend them.

2 Why the inputs matter

Weak inputs mean a weak policy

Expectations → Optimiser → Policy portfolio

IN THE LESSON

- Here is why the chart matters so much.
- On the left are the expectations.
- In the middle is the optimiser, a computer routine that finds the mix of assets with the best balance of return and risk, given those forecasts.
- On the right is the policy portfolio, the mix that Greywater will actually hold for years.
- Now the catch.
- The optimiser cannot tell a careful forecast from a careless one.
- It treats every input as true, and it leans hardest on the inputs that are most wrong.
- So however clever the optimiser, the policy portfolio can be no better than the expectations that went in.
- That is why the process of building them deserves real discipline.

3 The process, in stages

Prepare the ground

Needs → History → Models → Data

Produce and check

Apply → Publish → Monitor

IN THE LESSON

- So the process runs in stages.
- Read the top row from left to right.
- First, decide which expectations are needed and over what horizon.
- A trust with a very long horizon needs long run numbers for every asset class it might own, not a view on next quarter.
- Second, study the historical record, but only for context.
- It shows what has been possible, not what will happen.
- Third, choose the models that fit the question.
- Fourth, select the data sources those models need.
- Now the bottom row.
- Fifth, apply the models to today's conditions.
- Sixth, publish one agreed set of numbers.
- Seventh, monitor how the forecasts did, and feed the errors back into the next round, so the process learns from its mistakes.

4 The Level III point: consistency

- Every forecast rests on one macro view
- Shares: boom good. Bonds: recession good
- Boom for shares plus recession for bonds clash
- The optimiser takes both at face value

IN THE LESSON

- Now the idea that matters most at Level Three, which is consistency.
- Think of two painters decorating one house, each told a different colour scheme.
- Each room may look fine, but the house will not.
- Forecasts for different asset classes are the same.
- Shares do well in a boom and badly in a recession.
- High quality bonds are the other way round.
- So every forecast must come from one shared view of the economy.
- If the equity team assumes a boom while the bond team assumes a recession, the optimiser has no way to notice the clash.
- It takes both at face value and can produce extreme weights.
- Let us see how big the error is in numbers.

5 Example 1: Northgate's mixed pack

Policy mix: 60% shares, 40% bonds

Equities, growth view	2 yield + 6 growth	**8.0%**
Bonds, recession view	4 + 7.5 × 1.5 ÷ 5	**6.25%**
Pack's policy return	0.6 × 8.0 + 0.4 × 6.25	**7.3%**

IN THE LESSON

- Example one.
- Northgate's pack arrives, and Tessa checks the story behind each number.
- The equity team assumes strong growth.
- It expects a dividend yield of two per cent plus nominal earnings growth of six per cent, so shares return eight per cent.
- The bond team assumes a recession.
- Bonds yield four per cent.
- With a duration of seven and a half, a fall in yields of one and a half points over five years adds a rough price gain, spread over five years, so bonds return six and a quarter per cent.
- At sixty forty, the pack promises sixty per cent of eight plus forty per cent of six and a quarter.
- That is seven point three per cent a year, which looks very attractive.

6 Example 2: one shared view

One view: 2% real growth, 2% inflation, yields flat

Equities	2 yield + 2 real + 2 inflation	**6.0%**
Bonds	yield unchanged	**4.0%**
Policy return	0.6 × 6.0 + 0.4 × 4.0	**5.2%**
Pack overstated by	7.3 − 5.2	**2.1 points**

IN THE LESSON

- Example two.
- Now Tessa asks what the same portfolio earns if both teams share one view: real growth of two per cent, inflation of two per cent, and bond yields unchanged.
- Shares then return the two per cent yield plus two plus two of nominal growth, which is six per cent.
- Bonds simply return their four per cent yield.
- The policy return is sixty per cent of six plus forty per cent of four, which is five point two per cent.
- Compare that with the pack's seven point three.
- The pack overstated the return by two point one points, because no single economy delivers a boom for shares and a recession for bonds at once.
- The consistent number is the one to defend.

7 Pack against shared view

Expected return (% a year)

Pack	**8.0**
Shared	**6.0**
Pack	**6.25**
Shared	**4.0**
Pack	**7.3**
Shared	**5.2**

Pairs: shares, bonds, then the 60/40 portfolio

IN THE LESSON

- Here are the same results as bars, in pairs.
- Read the chart from left to right.
- The first pair is shares: the pack says eight, the shared view says six.
- The second pair is bonds: six and a quarter against four.
- The third pair is the whole portfolio: seven point three against five point two.
- Every red pack bar is taller than its green partner, because the pack took the kind half of each scenario.
- An optimiser given the red bars would think both assets beat cash by a wide margin, and if it were allowed to borrow, it might pile into them.
- The fix is a matter of process rather than arithmetic.
- Agree the economic scenario first, then derive every forecast from it.

8 A story: the stretched tape

- Data: what was recorded
- Methods: how the record is used
- Analyst: the habits of the mind
- Name the flaw, its direction, and the fix

IN THE LESSON

- Suppose you must measure a room.
- Your tape has stretched, the numbers you were given were written down late, and you secretly hope the room is big enough for your sofa.
- Three things can go wrong at once: the tape, the way you use it, and you.
- Forecasting has the same three.
- There are problems in the data, in the methods applied to the data, and in the analyst.
- An exam question will often describe one of these without naming it.
- A good answer does three things: it names the distortion, says which way it pushes the forecast, and gives the remedy.
- Back to Tessa, who is now vetting the inputs that Northgate sent.

9 Where data and methods go wrong

Data problems

Lags → Survivors → Smoothing

Method problems

Regimes → Mining → Conditions

IN THE LESSON

- This picture sorts the obstacles by where they arise, one row each.
- The top row is the data, and it is about what was recorded.
- Figures arrive late and then get revised.
- Funds that failed vanish from a database, leaving only the survivors.
- And appraisal based prices lag the market and look calmer than it really is.
- The bottom row is the methods, meaning how the record is used.
- A long sample may mix different regimes.
- A pattern may appear only because many variables were tried until one worked, which is data mining.
- And a relationship averaged over booms and recessions may hide how it behaves in each, which is what ignoring conditioning information means.
- The analyst comes at the end of this part.

10 Data flaws and their cures

Each data flaw pushes the forecast one way

Data flaw	Cure
Lags, revisions, rebasing	Real-time data
Transcription errors	Cross-check
Survivorship bias	Add failures
Appraisal smoothing	Unsmooth

IN THE LESSON

- Start with the data flaws and their cures.
- Economic data arrive with lags, are revised later, and are sometimes rebased to a new base year.
- If you test a forecasting rule on today's revised figures, you use information nobody had at the time, so use the data as first released.
- Series also contain transcription errors, where a number is mistyped, so cross check against a second source.
- Survivorship bias arises when failed funds drop out of a database, so average returns look too good.
- The cure is to include the failures.
- Appraisal smoothing arises because values of private assets come from valuers who adjust slowly, so risk and correlation look too low.
- The cure is to unsmooth the series.

11 Example 3: survivors only

Greywater's hedge fund database: ten funds started

Eight survivors	average return	**9.0%**
Two closed funds	average return	**−6.0%**
All ten funds	(8 × 9 + 2 × −6) ÷ 10	**6.0%**
Survivorship bias	9.0 − 6.0	**3.0 points**

IN THE LESSON

- Example three.
- Greywater's consultant proposes a hedge fund allocation and shows a database average of nine per cent.
- Tessa asks how many funds started.
- Ten did.
- Eight still report, and they average nine per cent.
- Two closed after averaging minus six per cent and were dropped from the database.
- Include them, and the average of all ten is eight times nine plus two times minus six, divided by ten, which is six per cent.
- The survivors overstate the return by three points.
- Survivorship bias always flatters the past, which makes the asset look better than an investor could ever have found it in real life.

12 Unsmoothing a volatility

True vol = Reported vol × √[(1 + λ) ÷ (1 − λ)]

True volatility	Risk the owner really bears
Reported volatility	From the smoothed series
Smoothing weight	Weight on last period's value
Multiplier	Always above one if smoothed

IN THE LESSON

- Now the formula for appraisal smoothing.
- Think of a valuer who, each quarter, gives most weight to last quarter's value and only a little to what the market did.
- The reported series then looks like a calm hill instead of a bumpy road.
- Call the weight on the previous value lambda, the smoothing weight.
- If true returns are independent from one period to the next, reported volatility is too low by a known factor.
- To undo it, multiply reported volatility by the square root of one plus lambda, over one minus lambda.
- The bigger lambda is, the bigger the multiplier.
- The same smoothing also drags down the correlation with listed assets, so the cure helps there too.

13 Example 4: the true risk

Reported volatility 5%, smoothing weight 0.6

Multiplier	√(1.6 ÷ 0.4) = √4	**2.0**
True volatility	5% × 2.0	**10.0%**
Return ÷ risk, database	9 ÷ 5	**1.8**
Return ÷ risk, corrected	6 ÷ 10	**0.6**

IN THE LESSON

- Example four.
- The consultant also quotes five per cent volatility for the hedge funds, from smoothed, appraisal based reports.
- Suppose the smoothing weight is zero point six.
- The multiplier is the square root of one point six over zero point four, which is the square root of four, which is two.
- True volatility is five times two, ten per cent.
- Now compare return per unit of risk.
- The database says nine divided by five, one point eight.
- After correcting both the survivorship and the smoothing, it is six divided by ten, zero point six.
- The asset that looked so good turns out to be far less attractive, and an optimiser fed the original numbers would have loaded up on it.

14 Method flaws: regimes, rare events, patterns

- Regimes: a long sample may mix different worlds
- Peso: 5% yearly crash risk, 20 calm years 36% likely
- Mining, time-period bias: patterns that are not real
- Conditioning: relationships shift with the economy

IN THE LESSON

- Now the method problems.
- A long sample feels safer, but it may stretch across different regimes, such as a time of fixed exchange rates and a time of floating ones, so old data may describe a world that no longer exists.
- The peso problem is a rare event that did not happen in the sample.
- Suppose a crash has a five per cent chance each year.
- Twenty calm years in a row are still about thirty six per cent likely, so the sample shows no crash and the risk is understated.
- Data mining and time period bias produce patterns that are not real.
- And ignoring conditioning information means treating a relationship as fixed when it depends on the state of the economy.

15 Example 5: twenty tries

Twenty unrelated indicators tested for Greywater

Indicators tested	none truly predicts	**20**
False alarm chance, each	5% test level	**5%**
Chance none fires falsely	0.95 ^ 20	**35.8%**
Chance at least one fires	1 − 0.358	**64.2%**
The cure	test on new data	**out of sample**

IN THE LESSON

- Example five.
- Tessa's analyst tests twenty unrelated indicators against share returns, using the usual five per cent significance level.
- None of them truly predicts anything.
- Each test has a five per cent chance of a false alarm.
- The chance that none of the twenty fires falsely is zero point nine five to the power twenty, which is about thirty five point eight per cent.
- So the chance that at least one fires is one minus that, sixty four point two per cent.
- Report only the winner and you present a coincidence as a discovery.
- The cure is to state a reason in advance, and to test the rule on data that were not used to find it.

16 Analyst biases and remedies

Four biases, each with a remedy

Bias	Remedy
Anchoring	Start afresh
Confirmation	Argue against
Status quo	Re-test yearly
Overconfidence	Wider ranges

IN THE LESSON

- Last, the analyst.
- Four habits of mind distort judgement.
- Anchoring is sticking to a first number, such as last year's forecast, and adjusting too little.
- The remedy is to start afresh from a blank page.
- Confirmation bias is seeking evidence that supports a view already held.
- The remedy is to argue against your own case.
- Status quo bias is leaving forecasts as they are because change feels risky.
- The remedy is to re-test the forecast every year.
- Overconfidence is quoting ranges that are too narrow.
- The remedy is to widen the ranges and keep a record of how often you were right.
- Again: name the bias, say which way it pushes, and give the fix.

17 Mistakes to avoid so far

- Each asset class built on its own economic view
- Long history as one regime; rare events missed
- Appraisal volatility taken at face value
- Survivor averages quoted as the whole picture
- Bias named without direction or remedy

IN THE LESSON

- Let us stop and collect the common mistakes.
- One: building each asset class on its own view of the economy, so that a boom and a recession sit in the same pack.
- Two: trusting a long history as though it were one regime, and forgetting rare events that never happened in the sample.
- Three: taking appraisal based volatility at face value, when smoothing makes private assets look safer and less correlated than they are.
- Four: quoting survivor averages as the whole picture.
- Five: naming a bias without its direction and its remedy, which earns only half the marks.
- A slow check of each input before it reaches the optimiser prevents all five.

18 A story: the river and the landslide

- Trend growth moves slowly: workers and productivity
- Outside shocks can push it onto a new path
- Policy, technology, war, disaster, resources, crisis
- Key question: level shift, or growth-rate shift?

IN THE LESSON

- Picture a wide, slow river.
- Its course changes little from year to year, because it is shaped by the land.
- That is trend growth.
- It moves slowly, driven by the number of workers and by how much each produces.
- Now imagine a landslide, a new canal or a flood.
- Each can send the river down a new course.
- Outside events do the same to an economy.
- They include policy changes such as tax reform or trade liberalisation, new products and technologies, wars, natural disasters, discoveries or depletion of natural resources, and financial crises.
- For Tessa, forecasting far ahead for Greywater's home market of Arden, the question is not only how big a shock is, but what kind of shock it is.

19 A lower level, or a different slope

Chart: Output index (start = 100) vs Years from today (0 to 10)

- Growth to 3%: 130.5
- Old trend, 2%: 121.9
- Level shock, −5%: 115.8
- Shock at year 3

IN THE LESSON

- Here is the picture.
- The horizontal axis is time, ten years from today.
- The vertical axis is output, as an index that starts at one hundred.
- First the grey line, the old trend, growing at two per cent a year.
- It reaches one hundred twenty one point nine.
- At year three a shock hits.
- The red line is a level shock: output drops five per cent once, then grows at two per cent again.
- It runs alongside the old trend but below it, ending at one hundred fifteen point eight.
- The green line is a growth shock: nothing drops, but growth rises to three per cent from year three, and by year ten output is one hundred thirty point five.
- A level shock leaves a permanent gap that stays the same proportion, five per cent.
- A growth shock opens a gap that keeps widening.

20 Which shocks hit what

Typical effect, judged case by case

Shock	Mainly hits
Natural disaster	Level
New technology	Growth rate
Trade opening	Both
Banking crisis	Both

IN THE LESSON

- Different shocks do different things.
- This table gives the typical effect, so treat it as a guide and not a law.
- A natural disaster destroys capital and so mainly lowers the level of output, although rebuilding can bring fast growth for a while.
- A new technology, such as an invention adopted across many industries, lifts productivity growth for years, so it hits the growth rate.
- Opening up trade usually gives a gain in efficiency, and it may raise growth as well, so it can be both.
- A banking crisis cuts output when lending stops, and damaged credit and investment can slow growth afterwards, so it is also both.
- The table is a guide only, so always judge the case in front of you on its own facts.

21 Example 6: after the banking crisis

Arden: output 94 vs trend 100; yield 2.5%, inflation 2%

Full reversion needed	(121.9 ÷ 94)^(1/10) − 1	**2.63%**
Level loss only	growth back at old slope	**2.0%**
Level loss, slower growth	damaged credit, investment	**1.5%**
Equity, before dilution	2.5 + 2 + each rate	**7.1, 6.5, 6.0%**

IN THE LESSON

- Example six.
- A banking crisis has left Arden's output at ninety four, against an old trend line that stands at one hundred.
- At the old two per cent trend, that line will be at one hundred twenty one point nine in ten years.
- Tessa needs a ten year growth input for equities, built from a dividend yield of two and a half per cent, plus inflation of two per cent, plus real growth.
- If she assumes the economy climbs back to the old path, growth must run at the ratio of one hundred twenty one point nine to ninety four, to the power one tenth, less one.
- That is two point six three per cent.
- If only the level was lost, growth returns to two per cent.
- If credit and investment stay damaged, perhaps one and a half.
- The equity forecasts, before any dilution, are seven point one, six point five and six per cent.

22 The trap: every shock is temporary

- Trap: treating every shock as temporary
- Full reversion: 7.1% forecast; lasting slowdown: 6.0%
- Ask: what happened to the level? to the growth rate?
- What would bring the economy back to the old path?

IN THE LESSON

- The trap is the comfortable assumption that every shock is temporary.
- After a bad year it is natural to assume the economy will bounce back to where it was heading.
- Sometimes it does.
- But look at what Tessa's numbers show.
- Assuming full reversion gives an equity forecast of seven point one per cent, while a lasting slowdown gives six per cent.
- That is more than a percentage point a year, every year, for the whole horizon.
- A shock gives no reason, by itself, to expect the gap to close.
- So always ask three questions: what happened to the level, what happened to the growth rate, and is there any mechanism that would bring the economy back to its old path?

23 A story: the boat and the tide

- Over decades, profits cannot outgrow the economy
- Trend nominal growth anchors earnings growth
- Potential growth: what labour and productivity allow
- Short-cycle growth is the wrong input

IN THE LESSON

- Think of a boat on the sea.
- In a storm the boat can rise and fall far more than the tide.
- But over decades it cannot climb faster than the water it floats on.
- Company profits are like the boat, and the economy is the sea.
- Over long horizons, total profits cannot outgrow the economy for ever, so the trend growth of nominal output anchors the growth of earnings.
- That makes the estimate of trend growth the first step in a long run return forecast.
- Trend growth also shapes real interest rates, so it matters for bonds too.
- This is why a strategic forecaster cares about potential growth, and not about this year's boom or slump.

24 Potential growth: two sources

Potential growth = Labour force growth + Productivity growth

Potential growth	Real growth it can sustain
Labour force growth	More workers
Productivity growth	More output per worker

IN THE LESSON

- First, potential growth.
- It is the speed at which the economy can expand over time without pushing inflation up.
- It has two sources.
- More workers, which is labour force growth.
- And more output from each worker, which is labour productivity growth.
- Add them together.
- Notice that this is a trend, an average through a full cycle, so it ignores booms and slumps.
- It is also a real growth rate, measured before inflation is added.
- When a vignette gives you the growth of the labour force and the growth of productivity, this simple sum is usually all that is needed.
- Then we split productivity further, to see where it comes from.

25 Growth accounting

$$\%\Delta Y = \%\Delta A + \alpha \times \%\Delta K + (1 - \alpha) \times \%\Delta L$$

Output growth	Growth of output
Total factor productivity	Growth not due to inputs
Capital's share	Slice of income to capital
Capital growth	Growth of the capital stock
Labour growth	Growth of the labour force

IN THE LESSON

- Growth accounting splits the same total into three parts.
- Output growth equals the growth of total factor productivity, plus capital's share of income times capital growth, plus labour's share, which is one minus that, times labour growth.
- Total factor productivity is the part of growth that more capital and more labour do not explain: better technology, better methods, better organisation.
- The two shares add up to one.
- Capital's share is the slice of national income that goes to the owners of capital, and labour's share is the rest.
- This is a useful check on any growth assumption, because it shows which of the engines would have to do the work.

26 Example 7: Arden's potential growth

Arden: TFP +0.5%, capital +3%, labour +0.5%, share 0.4

Productivity	total factor	**0.5%**
Capital contribution	0.4 × 3	**1.2%**
Labour contribution	0.6 × 0.5	**0.3%**
Potential real growth	0.5 + 1.2 + 0.3	**2.0%**
Output per worker grows	0.5 + 0.4 × (3 − 0.5)	**1.5%**

IN THE LESSON

- Example seven.
- Arden's total factor productivity grows a half of one per cent a year, its capital stock three per cent, and its labour force a half of one per cent.
- Capital's share of income is zero point four.
- Productivity contributes a half.
- Capital contributes zero point four times three, one point two.
- Labour contributes zero point six times a half, zero point three.
- The sum is two per cent potential real growth.
- Now the quick check.
- Capital per worker grows by three less a half, so output per worker grows by a half plus zero point four times that gap, which is one and a half per cent.
- Add the labour force growth of a half, and the answer is two again.
- Both routes agree.

27 From growth to an equity return

E(R) ≈ Yield + Real growth + Inflation − Dilution

Dividend yield	Cash the market pays out
Real trend growth	Trend, from labour and output
Inflation	Turns real into nominal
Dilution	New shares share out earnings
Expected equity return	A rough long-run anchor

IN THE LESSON

- Now turn growth into a return.
- A simple long run estimate for shares adds up four pieces.
- The dividend yield, which is the cash the market pays out each year.
- Real trend growth, from labour and productivity.
- Inflation, which turns real growth into nominal growth, since earnings are measured in money.
- And then subtract dilution.
- When new companies list and existing ones issue shares, total earnings can grow with the economy while earnings for the shares you already hold grow more slowly.
- Read it as a rough long run anchor, not a full breakdown into yield, earnings growth per share and change in valuation.
- It assumes the valuation multiple stays where it is.

28 Example 8: a ten-year equity forecast

Arden shares: yield 2.5%, inflation 2%, dilution 1%

Nominal trend growth	2.0 + 2.0	**4.0%**
Simple anchor	2.5 + 4.0	**6.5%**
After dilution	6.5 − 1.0	**5.5%**
Using last year's 5% growth	2.5 + 5 + 2 − 1	**8.5%**

IN THE LESSON

- Example eight.
- Tessa wants a ten year forecast for Arden's shares.
- The dividend yield is two and a half per cent, inflation is two per cent, and dilution is about one per cent.
- Real trend growth is two, from example seven.
- Nominal trend growth is two plus two, four.
- The simple anchor is the yield plus that, six and a half per cent.
- Take off one point for dilution and the estimate is five and a half per cent.
- Now the trap.
- Suppose a junior colleague uses last year's boom growth of five per cent instead.
- The estimate becomes two and a half plus five plus two minus one, eight and a half per cent.
- Same market, same yield, and an answer far too high.

29 Growth and real interest rates

Chart: Real interest rate vs Trend growth (low to high)

- Fast growth, high real rate
- Slow growth, low real rate

IN THE LESSON

- There is one more link, this time to bonds.
- Look at the axes.
- Along the bottom is trend growth.
- Up the side is the real interest rate, the rate after taking out inflation.
- The line rises.
- An economy that can grow quickly offers firms profitable uses for money, so borrowers will pay more to borrow, and savers must be paid more to lend rather than spend.
- A slow growing economy offers fewer good uses, so real rates tend to be lower.
- At the top right sits a fast growth, high real rate economy, and at the bottom left a slow growth, low real rate one.
- So the growth view Tessa chooses should show up in both her equity forecast and her bond forecast.
- That is the consistency idea from the start of the lesson again.

30 Traps: cycle growth and foreign earnings

- Trap: this year's boom, not trend (8.5% vs 5.5%)
- Listed firms may earn abroad, not at home
- New listings and share issues dilute holders
- The anchor is a start: adjust it, state it

IN THE LESSON

- Two traps remain.
- The first is plugging in the growth rate of the current cycle instead of the trend.
- We saw it in example eight, with eight and a half instead of five and a half.
- The second is forgetting that the earnings of listed companies can drift away from domestic output.
- If many firms earn their revenue abroad, they follow the growth of other economies.
- And if new firms list or old ones issue shares, existing holders own a smaller slice of the profits.
- So treat the output anchor as a starting point and adjust it.
- And always say which assumption you used: trend or cycle, domestic or foreign earnings, with or without dilution.

31 Recap: the lesson in five lines

- Expectations feed policy: build them in stages
- One macro view for every asset class
- Name each flaw, its direction, its fix
- A shock: level, rate or both? Do not assume reversion
- Yield + real growth + inflation − dilution ≈ return

IN THE LESSON

- Let us pull the lesson together.
- First, expectations are the raw material of the policy portfolio, and a sound process runs from needs and horizon, through history, models and data, to applying, publishing and monitoring.
- Every forecast must rest on one shared view of the economy.
- Second, name the flaw in the data, the methods or the analyst, say which way it pushes the forecast, and give the fix.
- Third, ask whether a shock moves the level, the growth rate or both, and do not assume a return to the old path.
- Fourth, potential growth comes from labour and productivity.
- Fifth, add yield and inflation, subtract dilution, and you have a long run anchor for shares.

32 Try three quick questions

1. Equity team assumes a boom, bond team a recession. What now?
   Answer: Rebuild both on one shared macro view.
2. Five funds: four survive at 8%, one closed at −12%. Average of all five?
   Answer: (4 × 8 − 12) ÷ 5 = 4.0%; survivors overstate by 4 points.
3. Yield 3%, labour −0.5%, productivity 2%, inflation 2%. Equity estimate?
   Answer: 3 + (−0.5 + 2) + 2 = 6.5%.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- The equity team assumes a boom and the bond team assumes a recession.
- What should Tessa do?
- Rebuild both sets of forecasts on one shared view of the economy.
- Question two.
- Five funds started.
- Four survive and average eight per cent, and one closed at minus twelve per cent.
- What is the average of all five?
- Four times eight plus minus twelve, divided by five, is four per cent, so the survivors overstate it by four points.
- Question three.
- The yield is three per cent, labour force growth is minus a half, productivity growth is two, and inflation is two.
- What is the equity estimate?
- Three plus one and a half plus two is six and a half per cent.
- Well done.