CHARTA LEARNING · LESSON NOTES

Residual income models in practice

Equity Investments

1 A story: the rent you could have earned

- Owners' money has a price: the required return r
- Residual income: profit left after charging for it
- Value = book value + PV of future residual income
- Positive RI adds value; zero RI adds none

IN THE LESSON

- Imagine you own a flat worth one hundred thousand, and you live in it.
- Had you sold it and put the money in a safe fund paying five per cent, you would have five thousand a year.
- So living in the flat only beats the fund if it gives you more than that.
- A company is the same.
- Its owners have money tied up in its book value, and they could have earned a return, called the required return on equity, elsewhere.
- Profit only creates value for owners once it clears that charge.
- What is left after the charge is residual income.
- Today's share value is book value plus the present value of all the residual income still to come.

2 Residual income, year by year

RI(t) = Net income(t) − r × Book value(t−1)

Net income per share	Earnings for year t
Equity charge: r times book	Required return times opening book
Opening book value	Book value at end of t−1
Residual income	Can be zero or negative

IN THE LESSON

- Here is the first formula.
- Residual income in year t equals net income in year t, less an equity charge.
- The charge is the required return on equity times the book value at the start of the year, because that is the money the owners had at work during the year.
- A short reminder from the first level: book value rolls forward by adding earnings and subtracting dividends.
- That is called the clean surplus relation, and we will come back to it at the end.
- A company earning a return on equity above r has positive residual income, and one earning exactly r has none.
- Notice that we charge on opening book value, not closing, which is a small detail that costs marks.

3 Single stage: constant ROE, constant growth

V0 = B0 + (ROE − r) × B0 ÷ (r − g)

Book value today	Starting point: book value
Spread: ROE minus r	Excess return per unit of book
Gap: r minus g	Must be positive
Intrinsic value	Value per share today

IN THE LESSON

- The simplest case has one stage.
- Suppose the return on equity stays constant and residual income grows at a constant rate g for ever.
- Then the present value of all that growing residual income collapses to one fraction.
- Next year's residual income, which is the spread between return on equity and r times today's book value, divided by r minus g.
- Add today's book value and you have the value of the share.
- This is just the Gordon growth idea applied to residual income.
- It needs g below r, or the fraction makes no sense.
- And it is only as good as the belief that the excess return really lasts for ever.

4 Example: one stage for a steady firm

B0 = 30.00, ROE = 14%, r = 10%, g = 3%

Spread	14% − 10%	**4%**
RI next year	0.04 × 30.00	**1.20**
PV of excess earnings	1.20 ÷ (0.10 − 0.03)	**17.14**
Value per share	30.00 + 17.14	**47.14**

Value ÷ book = 1.57: the premium is future excess return

IN THE LESSON

- Mina tries it on a small, steady business.
- Book value is thirty dollars a share, the return on equity is fourteen per cent, the required return is ten per cent, and residual income grows three per cent a year.
- The spread is four points.
- Next year's residual income is four per cent of thirty, one dollar twenty.
- Dividing by r minus g, which is seven per cent, gives about seventeen dollars fourteen for the present value of the excess earnings.
- Add the thirty of book value and the share is worth about forty seven dollars fourteen.
- That is one point five seven times book value.
- The price premium over book is exactly the value of future excess returns.

5 Why we need several stages

- Stage one: forecast RI for each year to a horizon
- Stage two: a continuing value for the years after
- Tail choices: persists, drops to zero, or fades
- Fade is controlled by omega, between zero and one

IN THE LESSON

- A single stage is too neat.
- Think of a restaurant that opens to queues around the block.
- For a few years it earns far more than owners could get elsewhere.
- Then rivals copy it, the queue shortens, and the excess return fades.
- A model that holds the spread for ever would overvalue it badly.
- Multistage models solve this.
- First you forecast residual income year by year over a horizon where you can say something sensible.
- Then you add a continuing residual income term for everything after, and you choose how that tail behaves.
- There are three classic choices.
- It persists at the final level, it drops to zero at once, or it fades gradually, governed by a persistence factor called omega.

6 Example: Calder Brook's three forecast years

B0 = 40.00, r = 10%. Earnings 6.00, 6.60, 7.26; dividends 2.00, 2.20, 2.42

Book value, end of year	44.00, 48.40, 53.24	**ROE 15%**
RI year 1	6.00 − 0.10 × 40.00	**2.00**
RI year 2	6.60 − 0.10 × 44.00	**2.20**
RI year 3	7.26 − 0.10 × 48.40	**2.42**

Each year book value = old book + earnings − dividends

IN THE LESSON

- Now Mina values a bigger case, Calder Brook Foods.
- Book value today is forty dollars and the required return is ten per cent.
- She forecasts earnings of six dollars, six sixty and seven twenty six over three years, and pays out about a third as dividends: two dollars, two twenty and two forty two.
- Using the clean surplus relation, book value grows to forty four, forty eight forty and fifty three twenty four.
- Residual income is earnings less ten per cent of opening book.
- Year one is six less four, two dollars.
- Year two is six sixty less four forty, two twenty.
- Year three is seven twenty six less four eighty four, two forty two.
- Keep those three numbers in your head.

7 The multistage value

V0 = B0 + Σ RI(t) ÷ (1+r)^t [t = 1 to T−1] + PV of CV

Book value today	Book value today
PV of explicit RI	Years one to T minus one
PV of continuing RI	Tail value, discounted
Intrinsic value	Value per share today

IN THE LESSON

- Here is the multistage formula.
- Value today is book value, plus the present value of the residual income you forecast explicitly, plus the present value of the continuing residual income.
- There is one convention to learn exactly.
- If your horizon ends at year T, the explicit residual income terms run from year one to year T minus one.
- The final year's residual income, year T, sits inside the continuing value, which is measured at the end of year T minus one.
- So with a three year horizon, you discount two explicit terms and a continuing value placed at the end of year two.
- Many candidates add all three years and then add a tail as well, which counts year three twice.

8 Continuing value with fading residual income

CV(T−1) = RI(T) ÷ (1 + r − ω), discounted T−1 years

Final-year RI	Last residual income you forecast
1 + r minus omega	Denominator of the fade
Omega: persistence	0 = vanishes, 1 = persists
Discount T minus 1 years	Two years in a three-year case

IN THE LESSON

- Now the tail.
- Suppose each year's residual income is omega times the previous year's, with omega between zero and one.
- Add up the fading stream, valued one year before the horizon, and it comes to the final year's residual income divided by one plus r minus omega.
- Check the two ends.
- With omega equal to one, residual income never fades, and the formula gives final residual income over r.
- With omega equal to zero, the excess return vanishes immediately, and you get the final year's residual income discounted one year.
- This value sits at the end of year T minus one, so you discount it back over T minus one periods, not T.

9 Example: omega of one half

B0 = 40.00, r = 10%, ω = 0.5, RI = 2.00, 2.20, 2.42

PV of RI years 1 and 2	2.00÷1.10 + 2.20÷1.21	**3.64**
Continuing value, year 2	2.42 ÷ (1.10 − 0.50)	**4.03**
Discounted two years	4.03 ÷ 1.21	**3.33**
Value per share	40.00 + 3.64 + 3.33	**46.97**

Trap: discounting over 3 years gives 46.67, too low

IN THE LESSON

- Mina decides that Calder Brook's excess return will fade, keeping half of its size each year, so omega is one half.
- First the two explicit terms.
- Two dollars over one point one, plus two twenty over one point one squared, gives about three dollars sixty four.
- Next the continuing value.
- Year three's residual income, two forty two, over one point one less point five, is about four dollars three cents, measured at the end of year two.
- Discount that over two years, dividing by one point one squared, and you get three dollars thirty three.
- Add book value forty, and the share is worth about forty six ninety seven.
- Discount over three years instead and you get forty six sixty seven.

10 What the tail assumption is worth

Value per share ($)

Stops, ω = 0	**45.45**
Fades, ω = 0.5	**46.97**
Persists, ω = 1	**63.64**

Same three forecast years; only the tail changes

IN THE LESSON

- Here is the same company under three tail assumptions.
- Along the bottom are the three cases, and up the side is value per share in dollars.
- Look at the first bar.
- If residual income stops dead after year three, the share is worth about forty five forty five, only a little more than the forty dollars of book plus the three years of excess earnings.
- The middle bar, with omega one half, gives forty six ninety seven.
- Now the tall bar.
- If residual income persists for ever, the continuing value jumps to twenty four twenty at the end of year two, and the share is worth about sixty three sixty four.
- Notice how the gain is not symmetric.
- Moving omega up from one half to one adds far more than moving it down to zero takes away.

11 A story: reading the price tag backwards

- Forward: assume growth, find value
- Backward: take price, find the growth it needs
- Unknowns left: only g, if B0, ROE and r are set
- Judge whether that growth is believable

IN THE LESSON

- Suppose you taste a sauce and try to guess the recipe.
- You work backwards from the result to the ingredients.
- Valuation can do the same.
- So far we fed in growth and got out a value.
- But the market has already put a price on the share.
- If we trust the book value, the return on equity and the required return, there is only one number left unknown, the growth rate of residual income.
- Set value equal to price, and solve for it.
- That number is the growth the market is paying for.
- Then you ask a better question than what is it worth: is that much growth believable for this company?

12 Implied growth from price to book

g = r − (ROE − r) ÷ (P/B − 1)

Implied growth g	Growth in RI the price implies
Required return r	Required return on equity
ROE minus r	Excess return on book
P/B minus 1	Premium over book

IN THE LESSON

- Start with the single stage model and set value equal to price.
- Price equals book plus the spread times book over r minus g.
- Move book to the left: price minus book equals spread times book over r minus g.
- Solve for g and you get r minus the spread times book, over price minus book.
- Divide top and bottom by book and it becomes the ratio form: g equals r minus the spread over price to book minus one.
- The trap is in that last term.
- The denominator is price to book minus one, which is the market premium over book, not price to book alone.
- Leaving out the minus one gives a growth rate that is far too high.

13 Example: what does sixty dollars assume?

P = 60.00, B0 = 40.00, so P/B = 1.5. r = 9%, ROE = 12%

Spread	12% − 9%	**3%**
Implied g	9% − 3% × 40 ÷ (60 − 40)	**3.0%**
Ratio form	9% − 3% ÷ (1.5 − 1)	**3.0%**
Check: value	40 + 0.03×40 ÷ 0.06	**60.00**
Trap: divide by P/B	9% − 3% ÷ 1.5	**7.0%**

Always divide by P/B minus one, or price minus book

IN THE LESSON

- Another company, Fennel Mills, trades at sixty dollars a share, and book value is forty, so price to book is one point five.
- Mina thinks the required return is nine per cent and the return on equity will hold at twelve.
- The spread is three points.
- Price minus book is twenty.
- So g equals nine per cent, less three per cent times forty over twenty.
- That is nine, less six.
- Growth of three per cent a year.
- In ratio form, three over point five is six, the same answer.
- A check: forty plus point zero three times forty over point zero six gives sixty.
- Now the trap.
- Dividing the spread by price to book alone gives two per cent off nine, an implied growth of seven.
- That is wrong by four points.

14 How the implied growth moves with ROE

Chart: Implied growth g (%) vs Expected ROE (%)

- r = 9%
- ROE 12%: g = 3%
- ROE 10%: g = 7%
- Not feasible: g above r

IN THE LESSON

- A picture helps with the spread.
- Along the bottom is the return on equity the analyst expects, from eight to fourteen per cent.
- Up the side is the growth rate the price implies.
- We hold price to book at one point five and the required return at nine per cent.
- The flat line is r.
- The curve slopes down: the more the company earns, the less growth the price needs.
- At twelve per cent, growth needed is three.
- At ten per cent it is seven.
- Where the curve meets the line at nine per cent, growth equals r, which is the edge of the model.
- To the left, return on equity is below r, and the formula gives a growth rate above r, which cannot be real.

15 Example: the same price, three businesses

P/B = 1.5 (so P/B − 1 = 0.5), r = 9%

ROE 12%	9% − 3% ÷ 0.5	**g = 3%**
ROE 9.5%	9% − 0.5% ÷ 0.5	**g = 8%**
ROE 8%	9% − (−1%) ÷ 0.5	**g = 11%**
Reading of 8%	g above r: impossible	**ROE must rise**

A thin spread makes the price demand a lot of growth

IN THE LESSON

- Now the lesson in the numbers.
- Keep price to book at one point five and r at nine per cent.
- For the business earning twelve per cent, growth needed is three per cent: a modest demand.
- For one earning nine and a half, the spread is just half a point, and half a point divided by point five is one point.
- So g is nine minus one, eight per cent, almost as high as r.
- That growth is demanding, and fragile, because r minus g is only one point.
- Now a business earning eight, below its required return.
- The spread is negative one point, and g is nine plus two, eleven per cent, above r.
- No such growth is possible.
- The price must be assuming return on equity will rise above r.

16 A story: the bakery and its rivals

- Continuing RI: what comes after the forecast horizon
- Four cases: persists, zero, fades, industry level
- Omega, 0 to 1, sets the speed of the fade
- Defend the choice with the firm and its industry

IN THE LESSON

- Go back to the restaurant with the queue.
- Its residual income is the profit that other cooks would love to copy.
- Continuing residual income is the residual income expected after the last year you forecast, and it often drives the value more than all the years before it.
- The question is how fast rivals will take it away.
- Analysts use four common answers.
- The excess return carries on at the final level for ever.
- It drops to zero at once.
- It declines gradually as return on equity fades towards r, governed by omega.
- Or it settles where return on equity reaches a long run level typical of the industry.
- Your job is to defend the choice with the facts.

17 One final year, four tails

Final-year RI = 2.42, r = 10%. Value at end of year 2

Tail assumption	CV at year 2
Persists for ever, ω = 1	24.20
Fades slowly, ω = 0.9	12.10
Fades faster, ω = 0.5	4.03
Stops after year 3, ω = 0	2.20

IN THE LESSON

- Here is how much rides on the choice.
- Calder Brook's final year residual income is two forty two, with r at ten per cent.
- Valued at the end of year two, one year before the horizon, persistence for ever gives twenty four twenty, because two forty two over point one is twenty four twenty.
- A slow fade with omega at point nine gives twelve ten, half as much.
- A faster fade, omega at one half, gives four dollars three cents.
- And a drop to zero gives two twenty, which is just the final year itself.
- Notice the gap between persisting and a very slow fade.
- One tenth of fading cuts the value in half, because a perpetuity is very sensitive.
- The big decision is permanence versus some decay.

18 Return on equity fading towards r

Chart: Return on equity (%) vs Years after the horizon

- ROE at horizon
- Fading: RI shrinks
- Required return r

IN THE LESSON

- Here is the fade in a picture.
- Along the bottom is time after the forecast horizon, in years.
- Up the side is the return on equity.
- The flat line is the required return.
- The curve starts high, at the level of the final forecast year, then slopes down and flattens as it closes in on the line.
- As return on equity falls towards r, residual income falls towards zero, which is exactly what a persistence factor between zero and one describes.
- The gap between curve and line is the spread, and the gap shrinks each year.
- A company with a strong moat has a curve that falls slowly.
- A company in an easy industry has a curve that drops quickly and meets the line early.

19 What sets the persistence factor

Evidence in a case and what it suggests

Evidence	Suggests
Weak competitive advantage	Low ω
High payout of earnings	Low ω
Extreme accruals, large special items	Low ω
Durable edge, such as patents	High ω

IN THE LESSON

- So which omega should you pick?
- Look for the features that protect or erode an excess return.
- A low omega suits a company with weak competitive advantages, because rivals can copy it.
- It suits a company that pays out most of its earnings, since it has little to reinvest at high returns.
- It suits one with extreme accruals, where reported profit may reverse, and one with large special items, which will not repeat.
- A high omega suits durable advantages such as patents or strong brands, low payout with attractive places to reinvest, and modest accruals.
- These are judgements, and the exam will ask you to match the evidence in a case to a high or low omega.

20 Example: Alpha defends it, Beta cannot

Same forecasts: B0 = 40.00, r = 10%, RI 2.00, 2.20, 2.42

Alpha, ω = 0.8	CV 8.07, PV 6.67	**V = 50.30**
Beta, ω = 0.3	CV 3.03, PV 2.50	**V = 46.14**
Beta if it persists	CV 24.20, PV 20.00	**V = 63.64**
Overstatement for Beta	63.64 − 46.14	**17.50**

Persistence for a low-barrier business is the classic error

IN THE LESSON

- Two companies both forecast final year residual income of two forty two, and both have r of ten per cent.
- Alpha holds patents with fifteen years to run, and keeps most of its earnings.
- Mina gives it omega of point eight.
- Its continuing value at year two is two forty two over point three, about eight dollars seven cents, and discounted two years about six sixty seven.
- Beta runs a catering business anyone can enter, pays out most of its earnings and reports big accruals.
- She gives it omega of point three.
- Its continuing value is three oh three, discounted to two fifty.
- With the same book and explicit years, Alpha is worth about fifty dollars thirty, Beta about forty six fourteen.
- Assuming Beta persists for ever gives sixty three sixty four.

21 Mistakes to avoid so far

- Discounting the tail over T years, not T−1
- Counting year T twice, or omega on the wrong year
- Dividing by P/B instead of P/B minus 1
- P/B above 1 with ROE below r: ROE must rise
- Perpetual excess returns in a competitive industry

IN THE LESSON

- Let us stop and collect the traps from the first three parts.
- First, discounting the continuing value over T periods when it is measured at T minus one.
- Second, applying omega to the wrong year, or counting year three twice, once as explicit residual income and again inside the continuing value.
- Third, in the implied growth formula, dividing by price to book instead of price to book minus one.
- Fourth, forgetting that when return on equity is below r, a price above book cannot come from the present spread.
- The market must expect the return to rise.
- Fifth, and most expensive, assuming that excess returns last for ever for a company in a competitive industry with low barriers to entry.

22 A story: three ways to split one bill

- DDM, FCFE and RI are all present value models
- Consistent inputs give the same total value
- They differ in when value is recognised
- RI recognises more of it today, from book value

IN THE LESSON

- Three friends share a dinner.
- One pays up front, one pays at the end, one pays in instalments.
- The total is the same, only the timing differs.
- Valuation models are like that.
- A dividend discount model, a free cash flow to equity model and a residual income model are all present value methods.
- With consistent assumptions they must give the same value, because they are measuring the same thing, the owners' claim on the company.
- What differs is when each one recognises that value.
- Dividend and cash flow models push much of it into a terminal value, far in the future, where forecasts are least reliable.
- Residual income starts with book value today and adds excess earnings.

23 Example: a company that pays nothing

B0 = 25.00, ROE = 14%, r = 10%, no payout for 3 years

Book value, years 1 to 3	28.50, 32.49, 37.04	**×1.14**
RI years 1 to 3	1.00, 1.14, 1.30	**4% of book**
RI value	25.00 + PV of RI (2.83)	**27.83**
Dividend value	37.04 ÷ 1.10^3	**27.83**

Two models, one value, different timing

IN THE LESSON

- Consider a company that pays no dividends for three years.
- Book value is twenty five dollars, it earns fourteen per cent on equity and keeps everything, and r is ten per cent.
- After year three the return falls to r, so the share trades at book.
- Book value grows to twenty eight fifty, thirty two forty nine, then thirty seven oh four.
- Residual income is four per cent of opening book: one dollar, one fourteen and one thirty.
- Discounted, those add to two eighty three.
- The residual income value is twenty five plus two eighty three, twenty seven eighty three.
- The dividend model has nothing to discount until year three, when the price of thirty seven oh four, discounted three years, is also twenty seven eighty three.
- Same answer.

24 Where each model recognises the value

Value recognised ($)

RI: book today	**25.00**
RI: years 1-3	**2.83**
DDM: years 1-3	**0.00**
DDM: terminal	**27.83**

Both models total 27.83 per share

IN THE LESSON

- Let us see that timing in a picture.
- Along the bottom are four pieces of value, and up the side is dollars per share.
- Both models arrive at twenty seven eighty three.
- The first bar is the residual income model today: twenty five dollars, simply book value, already on the balance sheet.
- The second bar is the excess earnings in years one to three, two eighty three.
- Together, that is the whole value, and about ninety per cent was visible on day one.
- Now the dividend model.
- In years one to three it recognises nothing, because nothing is paid.
- Then the last bar shows the entire twenty seven eighty three arriving at once in the terminal value.
- That is why residual income depends less on the distant forecast.

25 Three models side by side

DDM, FCFE and RI compared

Feature	Model
Discounts dividends	DDM
Discounts cash left for owners	FCFE
Discounts excess earnings + book	RI
Most value recognised today	RI

IN THE LESSON

- Here is a short comparison to keep.
- The dividend model discounts dividends.
- The free cash flow to equity model discounts the cash left for owners after the company's investments.
- The residual income model discounts earnings above the equity charge, and adds book value.
- Residual income recognises the most value up front, and so has the smallest share of its value in the terminal figure.
- But it leans hardest on accounting data.
- Cash flow models are less exposed to accounting choices, although they have their own problems, such as lumpy investment.
- The trap is thinking the models measure different things.
- They do not.
- They allocate the same value differently across time, and consistent inputs give the same answer.

26 A story: the right tool for the job

- Strengths: smaller terminal share, usable data
- Works with no dividends or negative FCFE
- Weakness: relies on accounting numbers
- Weakness: needs clean surplus, or adjustments

IN THE LESSON

- A carpenter does not ask which tool is best.
- She asks which tool suits this board.
- Valuation models are the same, and residual income has a clear home.
- It works for companies that pay no dividends, where the dividend model has nothing to discount.
- It works where free cash flow is negative because the company is investing, where a cash flow model would rest almost entirely on a terminal value.
- It uses readily available accounting data.
- And it focuses on economic profit, earnings after charging for equity, rather than accounting profit alone.
- But it has weaknesses.
- It depends on accounting numbers that may be distorted or managed.
- It assumes a clean surplus relation.
- And it may need adjustments for items that go straight to equity.

27 Strengths and weaknesses at a glance

Residual income model: where it fits

Feature	Verdict
Terminal value share	Smaller
No dividend paid	Works
Negative free cash flow	Works
Book value unreliable	Weak

IN THE LESSON

- Here is the scorecard.
- On the strength side, the terminal value is a smaller share of the total, because book value and early excess earnings are counted first.
- The model works for companies with no dividend, and for those with negative expected free cash flow.
- It uses data from the balance sheet and income statement, and it highlights economic profit.
- On the weakness side, the accounting must be trusted, and managers can manage it.
- The clean surplus relation must hold, or be repaired.
- And the model is a poor fit when reported book values are unreliable, for instance after heavy aggressive accounting or large off balance sheet items.
- So the argument for using the model comes down to the company in front of you.

28 Example: a software company that pays nothing

B0 = 12.00, ROE = 18%, r = 11%, g = 4%; no dividend, FCFE < 0

Dividend model	nothing to discount	**unusable**
FCFE model	negative for 3 years	**terminal-driven**
RI next year	(0.18 − 0.11) × 12.00	**0.84**
Value per share	12.00 + 0.84 ÷ 0.07	**24.00**

Half of the 24.00 is book value already on the balance sheet

IN THE LESSON

- Mina values a software company.
- Book value is twelve dollars a share, built from paid in capital and retained earnings, with little in other comprehensive income.
- It pays no dividend, and expects negative free cash flow to equity for three years while it builds data centres.
- She forecasts a return on equity of eighteen per cent against a required return of eleven, and residual income growth of four per cent.
- Residual income next year is seven points of twelve, eighty four cents.
- Divided by seven per cent, that is twelve dollars.
- Add the book value of twelve, and the value is twenty four dollars.
- Half of it is book value, visible today, and none depends on a far off terminal cash flow.
- Residual income is the natural main model here.

29 A story: inheriting a house with a bad survey

- Book value is the starting point, so check it
- Clean surplus: all gains and losses in net income
- OCI items, such as currency translation, bypass it
- Adjust book value and strip out one-off items

IN THE LESSON

- When you buy a house, you check the survey.
- The price you offer starts from what the house is said to be worth, so a hidden crack makes every number after it wrong.
- The residual income model starts from book value in the same way, so it inherits whatever is wrong with it.
- Applying it means scrutinising the accounting.
- The clean surplus relation requires all gains and losses to pass through net income, but some go to other comprehensive income, such as currency translation differences.
- Book value may need adjusting for last in first out inventory under United States rules, off balance sheet obligations, and intangible assets.
- Aggressive accounting that delays expenses inflates both earnings and book value.

30 Example: a loss that skips the income statement

B0 = 80, r = 10%, net income 14, dividends 5, OCI loss 3

Closing book, clean surplus	80 + 14 − 5	**89**
Closing book, actual	89 − 3 (OCI loss)	**86**
RI on reported income	14 − 0.10 × 80	**6.0**
RI on comprehensive income	(14 − 3) − 8	**3.0**

The OCI loss halves the residual income

IN THE LESSON

- Here is the dirty surplus problem in numbers.
- A company starts the year with book value of eighty dollars and has r of ten per cent.
- It reports net income of fourteen and pays dividends of five.
- It also records a currency translation loss of three, in other comprehensive income, and expects similar losses every year.
- Clean surplus says the closing book value should be eighty plus fourteen minus five, eighty nine.
- The balance sheet says eighty six.
- Residual income on reported income is fourteen less eight, six dollars.
- Count the loss and comprehensive income is eleven, so residual income is three, half as much.
- Using reported return on equity without adjustment overstates the value the company will create.

31 Common accounting adjustments

Item and the usual adjustment

Item	Adjustment
LIFO inventory (US GAAP)	Add LIFO reserve
Off-balance-sheet debt	Bring on, cut book
Delayed expenses	Reverse the delay
One-off gains or losses	Strip out

IN THE LESSON

- Now a short checklist of adjustments.
- Inventory valued last in first out, allowed under United States rules only, understates book value when prices rise, so add the reserve, net of tax.
- Off balance sheet obligations are real claims on the owners, so bring them on and reduce book value.
- Intangible assets may be missing from book value or valued poorly, and need a considered adjustment.
- Aggressive accounting that delays expenses, such as capitalising costs, lifts today's earnings and book value but must reverse later, so reverse it.
- One off gains and losses should be stripped out before forecasting persistent residual income.
- And accounting rules differ between countries, so adjust before you compare.

32 Recap: the whole lesson in five lines

- V0 = B0 + PV of RI; tail fades by omega
- Tail: RI(T) ÷ (1 + r − ω), discount T−1 years
- Implied g = r − (ROE − r) ÷ (P/B − 1)
- Same value as DDM and FCFE, recognised sooner
- Best for no payout; check clean surplus and book

IN THE LESSON

- Let us pull it together.
- Residual income is earnings less a charge of r on opening book value, and the single stage value is book plus spread times book over r minus g.
- A multistage model adds explicit residual income to year T minus one and a continuing value, which with fading is final residual income over one plus r minus omega, discounted over T minus one years.
- The market price implies growth of r less the spread over price to book minus one.
- The tail assumption should match the firm's advantages.
- Residual income, dividend and cash flow models agree in value but differ in timing.
- The model suits no dividends and negative free cash flow, and it is only as good as the accounting.

33 Try three quick questions

1. B0 = 50, r = 8%, ROE = 12%, g = 2%. Single-stage value?
   Answer: RI = 2.00; 2.00 ÷ 0.06 = 33.33; V = 83.33
2. P/B = 2.0, r = 10%, ROE = 14%. Implied g?
   Answer: 10% − 4% ÷ (2 − 1) = 6%
3. Final RI = 3.00, r = 10%, ω = 0.7. CV at T−1?
   Answer: 3.00 ÷ (1.10 − 0.70) = 7.50

IN THE LESSON

- Now try three questions yourself.
- Pause after each one.
- Question one.
- Book value is fifty, r is eight per cent, return on equity is twelve per cent, and growth in residual income is two per cent.
- Value per share?
- The spread is four points, so next year's residual income is two dollars.
- Divide by r minus g, six per cent, to get thirty three thirty three, and add fifty.
- The value is eighty three thirty three.
- Question two.
- A share trades at twice book value, with r at ten per cent and return on equity at fourteen.
- What growth is implied?
- Four points over price to book minus one, which is one, so six per cent.
- Question three.
- Final year residual income is three dollars, r is ten per cent and omega is point seven.
- What is the continuing value at year T minus one?
- Three over point four, seven dollars fifty.