Residual income valuation

Equity Investments

1 A story: two shops with the same profit

- Same reported profit, very different capital used
- Accounts charge for debt, but not for own money
- Owners could have earned a return elsewhere
- Residual income = profit after charging for it

IN THE LESSON

- Imagine two shop owners who each make a profit of ten thousand a year.
- The first built her shop with only a little of her own savings.
- The second tied up two hundred thousand of his own money, which he could have invested elsewhere to earn twelve per cent a year, or twenty four thousand.
- Both accounts show the same profit.
- But is the second owner really better off?
- No.
- His shop earns far less than his own savings would have earned somewhere else.
- The accounts count the cost of borrowed money as interest, yet they treat the owner's own money as free.
- Residual income fixes that by charging for it.

2 Three measures, one idea

- Residual income: net income less an equity charge
- EVA: operating profit after tax less a charge on all capital
- MVA: market value of capital less capital invested
- In theory MVA = present value of future EVA

IN THE LESSON

- Here are the three measures.
- Residual income is for shareholders.
- It is net income, less a charge for the equity capital used.
- The charge is the required return on equity times the book value of equity at the start of the year.
- Economic value added, written E V A, is the same idea for the whole firm.
- It is operating profit after tax, less a charge for all the capital, debt and equity together, at the weighted average cost of capital.
- Market value added is different.
- It looks at the market's verdict.
- It is the market value of the company's capital, less the capital that investors put in.
- In theory it equals the present value of all future E V A.

3 Residual income, the equity version

RI = NI − r × B0 = (ROE − r) × B0

Residual income	Profit above the equity charge
Net income	Profit after interest and tax
r: cost of equity	What owners require
Opening book equity	Equity at start of the year
ROE: return on equity	Net income ÷ opening equity

IN THE LESSON

- Here is the formula.
- Residual income equals net income, minus the required return on equity, times the opening book value of equity.
- Take each piece in turn.
- Net income is the profit left for shareholders after interest and tax.
- The required return on equity, written r, is what shareholders demand for the risk they carry.
- Opening book value is the equity on the balance sheet at the start of the year.
- There is a second way to write it.
- Divide net income by opening equity and you get return on equity, so residual income also equals return on equity minus r, all times opening book value.

4 Economic value added, the firm version

EVA = NOPAT − WACC × Capital
NOPAT = EBIT × (1 − tax rate)

EVA	Profit above all capital costs
NOPAT	Profit before any financing cost
WACC	Blended cost of debt and equity
Invested capital	Debt plus equity put in

IN THE LESSON

- Now the whole firm.
- Economic value added equals N O P A T, minus the weighted average cost of capital, times invested capital.
- N O P A T stands for net operating profit after tax.
- You get it from E B I T, earnings before interest and tax, multiplied by one minus the tax rate.
- Notice that N O P A T is struck before any financing cost.
- The weighted average cost of capital, or W A C C, blends the after tax cost of debt and the cost of equity using their weights.
- Invested capital is the debt and equity that funded the business.
- The charge, W A C C times capital, pays both lenders and owners once.
- That is why we begin from N O P A T and never from net income.

5 Example 1: Thornbury Foods (the facts)

All amounts in millions; tax rate 25%

EBIT	operating profit	**80**
Debt, 6% before tax	interest 12	**200**
Book equity, cost 12%	at start of year	**300**
Net income	(80 − 12) × 0.75	**51**
Invested capital	200 + 300	**500**

IN THE LESSON

- Example one.
- Thornbury Foods is a made up bakery chain.
- Over the year it earned E B I T of eighty million and the tax rate is twenty five per cent.
- Its debt of two hundred million carries a pre tax rate of six per cent, so interest is twelve million.
- Book equity at the start of the year is three hundred million, and shareholders require twelve per cent.
- Net income is therefore fifty one million: eighty less twelve is sixty eight, and after tax at twenty five per cent that leaves fifty one.
- Invested capital is five hundred million.
- The weighted average cost of capital will turn out at nine per cent.

6 Example 1: EVA and residual income

Two routes to the same economic profit

NOPAT	80 × (1 − 0.25)	**60**
WACC	0.4 × 4.5% + 0.6 × 12%	**9.0%**
EVA	60 − 0.09 × 500	**15**
Residual income	51 − 0.12 × 300	**15**
Check by ROE	(17% − 12%) × 300	**15**

IN THE LESSON

- Now the calculation.
- First N O P A T.
- Eighty times one minus zero point two five is sixty.
- Next the cost of capital.
- Debt is forty per cent of capital and costs four and a half per cent after tax.
- Equity is sixty per cent and costs twelve per cent.
- Forty per cent of four and a half is one point eight, and sixty per cent of twelve is seven point two, so the weighted average cost of capital is nine per cent.
- The capital charge is nine per cent of five hundred, forty five.
- E V A is sixty less forty five, fifteen million.
- Now the equity route.
- The equity charge is twelve per cent of three hundred, thirty six.
- Fifty one less thirty six is fifteen.
- The return on equity is fifty one over three hundred, seventeen per cent, so seventeen less twelve, times three hundred, is fifteen again.
- Both routes give fifteen.

7 From operating profit to EVA

Millions

EBIT	**80**
NOPAT	**60**
Capital charge	**45**
EVA	**15**

Interest sits inside the capital charge, so it is not deducted again

IN THE LESSON

- Here it is as a picture.
- The vertical side shows millions, and each bar is one step down from the operating profit.
- The first bar is E B I T, eighty.
- Tax at twenty five per cent takes twenty away, leaving N O P A T of sixty, the second bar.
- The third bar is the capital charge, forty five, which is nine per cent of five hundred.
- It pays lenders and shareholders together, once.
- What is left is the last bar, E V A of fifteen.
- That is the profit above what all the capital costs.
- Notice there is no bar for interest.
- Interest is already inside the capital charge.
- If we started from net income and then took off the capital charge, we would be charging for the debt twice.

8 Market value added

MVA = Market value of capital − Invested capital

MVA	The premium over what went in
Market value of capital	Market value of equity plus debt
Invested capital	Debt plus equity put in

IN THE LESSON

- Residual income and E V A look at one year of profit.
- Market value added looks at the market's judgement of the whole future.
- It equals the market value of the company's capital, debt and equity together, minus the capital invested in it.
- Think of it as the premium the market pays over what was put in.
- A positive figure says the market believes management will keep earning above the cost of capital.
- In theory, market value added equals the present value of all future E V A, discounted at the cost of capital.
- So E V A is the flow of yearly profit above the capital cost, and market value added is the value of that whole flow in one number.

9 Example 2: Thornbury's market value added

Year end market values, millions

Market value of equity	shares in total	**420**
Market value of debt	close to book	**200**
Market value of capital	420 + 200	**620**
MVA	620 − 500	**120**
EVA 15 for ever	15 ÷ 0.09	**166.7**

IN THE LESSON

- Back to Thornbury.
- At the year end its shares have a total market value of four hundred and twenty million.
- Its debt is worth two hundred million in the market.
- So the market value of its capital is six hundred and twenty million.
- Investors put in five hundred million.
- Market value added is six hundred and twenty less five hundred, a hundred and twenty million.
- Now compare with the E V A.
- If the fifteen million of E V A lasted for ever, its present value would be fifteen divided by zero point zero nine, about a hundred and sixty seven million.
- The market is paying only a hundred and twenty.
- So the market expects Thornbury's excess profit to shrink over time, as rivals copy its success.

10 Example 3: profitable, yet destroying value

Net income falls to 30; same equity and 12% cost

Net income	positive, so looks fine	**30**
Equity charge	0.12 × 300 opening	**36**
Residual income	30 − 36	**−6**
ROE	30 ÷ 300	**10%**
Required return	ROE is below it	**12%**

IN THE LESSON

- A hard year for Thornbury.
- Suppose costs rise and net income falls to thirty million, still comfortably positive.
- The accounts say the company is profitable.
- But shareholders required twelve per cent on three hundred million, which is thirty six million.
- Thirty million less thirty six million is a residual income of minus six million.
- Return on equity was thirty divided by three hundred, ten per cent, below the twelve per cent required.
- So a company can report a profit and still destroy shareholder value.
- The exam trap here is the base for the charge.
- Use equity at the start of the year, three hundred, never the ending figure.
- And in E V A, never take interest off twice.

11 Where residual income is used

Investors

Value equity → Read the price → Screen and test

Boards

Judge managers → Set pay on EVA → Assess divisions

IN THE LESSON

- Why bother with all this?
- Because one calculation, profit less a charge for the capital used, serves two audiences.
- The top row is the investor's view.
- Investors use residual income to value equity, especially when a company pays no dividend or has negative free cash flow.
- They read a market price from it.
- They also screen shares and test goodwill for impairment.
- The bottom row is the board's view.
- A board judges managers by whether they beat the cost of equity, ties pay to E V A, and charges each division for the capital it uses.
- Both rows run on the same subtraction.
- The only difference is who is asking, and what they plan to do with the answer.

12 Valuing a company that pays no dividend

- No dividend: a dividend model has little to discount
- Negative free cash flow: cash models struggle too
- Starts from book value on the balance sheet
- Needs reliable accounting for book value

IN THE LESSON

- Think about a young company that pays no dividend, and has spent more than it earned for several years.
- A dividend model has nothing to discount for a long time, so almost all its value sits in a far off price.
- A free cash flow model has the same trouble: the early cash flows are negative.
- The residual income model starts somewhere solid.
- It takes the book value of equity already on the balance sheet, and adds the present value of the profit expected above the cost of equity.
- That is why it is the favourite model for firms with no dividends, or negative free cash flow.

13 Example 4: which division earns a bonus?

Cost of equity 11%; amounts in millions

Hill: profit 18, equity 200	ROE 9%	**18**
Hill residual income	18 − 0.11 × 200	**−4.0**
Dale: profit 10, equity 50	ROE 20%	**10**
Dale residual income	10 − 0.11 × 50	**4.5**
Bonus on profit / on RI	Hill first / Dale first	**reversed**

IN THE LESSON

- Example four.
- A group has a cost of equity of eleven per cent and two divisions.
- The Hill division earns eighteen million on two hundred million of equity.
- The Dale division earns ten million on fifty million of equity.
- The board is deciding which team earns the larger bonus.
- On profit alone, Hill wins, eighteen beats ten.
- Now charge for the equity.
- Hill is charged eleven per cent of two hundred, twenty two, so its residual income is minus four million.
- Dale is charged eleven per cent of fifty, five and a half, so its residual income is four and a half million.
- Return on equity is nine per cent at Hill and twenty per cent at Dale.
- The bigger profit belongs to the division that destroys value.

14 Reading the price, and the limits

- P/B above one: market expects positive residual income
- P/B below one: market expects returns below r
- EVA pay can tempt managers to cut investment
- Positive profit does not mean value is created

IN THE LESSON

- Residual income also helps you read a market price.
- Suppose a share trades above book value, a price to book ratio above one.
- The residual income model says the market is paying for future residual income, so it expects the company to earn more than its cost of equity.
- A ratio below one says the market expects returns below the cost of equity.
- Now the warning.
- Pay schemes built on E V A can encourage managers to cut investment to boost this year's number.
- And the biggest trap of all is thinking that positive accounting profit means value is being created.
- After the charge for equity, it may not.

15 Valuing a share: pay for the book, then for the extras

- Start with book value per share today
- Add the present value of future residual income
- Charge each year on opening book value
- Book grows by retained earnings

IN THE LESSON

- Now we value a share with the residual income model.
- Think of buying a rental flat.
- You would first pay for what is already there, the building.
- Then you would pay a bit more only if you expected the flat to earn more than you could earn on your money elsewhere.
- The model works the same way.
- The first part of the value is book value per share, what shareholders have put in.
- The second part is the present value of the residual income, the extra profit above the equity charge.
- Each year, residual income is earnings less the required return times book value at the start of that year.
- Book value itself grows by the earnings the company keeps, meaning earnings less dividends.

16 The residual income valuation formula

V0 = B0 + Σ RIt ÷ (1 + r)^t
RIt = Et − r × B(t−1)

Value today	Intrinsic value per share
Book value today	Equity per share on the books
Residual income	Profit above the equity charge
Earnings in year t	Earnings per share, year t
Opening book value	Book value at start of year t

IN THE LESSON

- Here is the formula.
- Value today equals book value per share today, plus the sum of each year's residual income divided by one plus r, raised to the power of the year.
- Each year's residual income equals that year's earnings per share, minus r times the book value at the start of the year.
- In symbols, B sub t minus one.
- And the book value rolls forward each year: new book value equals old book value, plus earnings, minus dividends.

17 Example 5: Larkspur Tools (the forecasts)

Per share; payout 40%; required return 10%

Book value today	B0	**30.00**
EPS, years 1 to 3	4.20, 4.60, 5.00	**forecast**
Dividends, years 1 to 3	40% of EPS	**1.68/1.84/2.00**
Required return	r	**10%**
After year 3	RI is zero	**fade**

IN THE LESSON

- Example five.
- Larkspur Tools is a made up maker of hand tools.
- An analyst forecasts per share figures for three years.
- Book value per share today is thirty.
- Earnings per share are four twenty, four sixty and five.
- The company pays out forty per cent of its earnings as dividends, so dividends are one sixty eight, one eighty four and two.
- The required return on equity is ten per cent.
- After year three, competition is expected to squeeze the company down to exactly the required return, so residual income is zero from year four on.
- The question is, what is one share worth today?
- We will first roll the book value forward, then charge for the equity, then discount.

18 Example 5, step 1: roll the book value forward

B(t) = B(t−1) + earnings − dividends

B1	30.00 + 4.20 − 1.68	**32.52**
B2	32.52 + 4.60 − 1.84	**35.28**
B3	35.28 + 5.00 − 2.00	**38.28**
Year 3 charge base	opening, so B2 = 35.28	**not B3**

IN THE LESSON

- Step one.
- Each year, new book value is old book value plus earnings less dividends.
- Year one: thirty, plus four twenty, less one sixty eight, gives thirty two fifty two.
- Year two: thirty two fifty two, plus four sixty, less one eighty four, gives thirty five twenty eight.
- Year three: thirty five twenty eight, plus five, less two, gives thirty eight twenty eight.
- Notice what we are doing.
- We are keeping the book value at the start of each year, because that is what the equity charge will use.
- For year three, the charge is ten per cent of the thirty five twenty eight, not of the thirty eight twenty eight that comes at the end of that year.

19 Example 5, step 2: residual income and value

RI = EPS − 10% × opening book; discount at 10%

Year 1	RI 1.20 ÷ 1.10	**1.09**
Year 2	RI 1.35 ÷ 1.21	**1.11**
Year 3	RI 1.47 ÷ 1.331	**1.11**
PV of residual income	1.09 + 1.11 + 1.11	**3.31**
Value per share	30.00 + 3.31	**33.31**

IN THE LESSON

- Step two.
- Residual income for each year is earnings less ten per cent of opening book.
- Year one: four twenty less three, which is one twenty.
- Year two: four sixty less ten per cent of thirty two fifty two, three twenty five, which is one thirty five.
- Year three: five less ten per cent of thirty five twenty eight, three fifty three, which is one forty seven.
- Now discount at ten per cent.
- One twenty over one point one is one oh nine.
- One thirty five over one point two one is one eleven.
- One forty seven over one point three three one is one eleven.
- They add to three thirty one.
- Value per share is thirty plus three thirty one, thirty three thirty one.

20 Where the value sits: two models, same answer

Dollars per share

Book value now	**30.00**
PV of RI	**3.31**
PV of dividends	**4.55**
PV of terminal	**28.76**

Left two bars: residual income model. Right two: dividend model

IN THE LESSON

- Now compare with a dividend model.
- The vertical side shows dollars per share.
- The first two bars are the residual income model.
- Book value today is thirty, already on the balance sheet.
- The present value of residual income adds only three thirty one.
- The last two bars are the dividend model on the same forecasts.
- The present value of the three dividends is four fifty five.
- The rest is the present value of the price at the end of year three.
- With residual income zero from then on, that price equals the year three book value of thirty eight twenty eight, worth twenty eight seventy six today.
- Both models add to thirty three thirty one.
- What differs is how much rests on a distant forecast.

21 When is value recognised?

- Dividend model: 86% of value in the terminal price
- Residual income: 90% already in book value
- Only the excess earnings need to be forecast
- Cost: you rely on reliable book value

IN THE LESSON

- This is the contrast the exam likes.
- In the dividend and free cash flow models, most of the value is often pushed into the terminal value, the price in some distant year.
- In our example, eighty six per cent of the dividend model's value is that one terminal figure.
- The residual income model recognises value earlier.
- Today's book value already carries much of the total, thirty out of thirty three thirty one, and the forecasts only have to supply the excess earnings, about ten per cent of the value.
- So the terminal value is a smaller share of the estimate.
- The price you pay is relying on a sensible book value.

22 Mid-lesson: the mistakes that cost marks

- Equity charge uses opening book, not ending
- EVA starts from NOPAT; never deduct interest twice
- Positive profit can still mean negative RI
- Value = book value + PV of RI, not PV alone

IN THE LESSON

- Let us pause on the mistakes.
- One: charging for equity on the same year's ending book value.
- The charge always uses opening book, the equity at the start of the year.
- Larkspur's year three charge uses thirty five twenty eight, not thirty eight twenty eight.
- Two: deducting interest twice.
- E V A starts from N O P A T, which is before interest, so do not start from net income and then subtract a charge on all capital.
- Three: assuming positive net income means value creation.
- If return on equity is below the required return, residual income is negative.
- Four: forgetting to add the book value back.
- The answer is book value plus the present value of residual income, never the present value alone.

23 What makes residual income big or small?

- RI is positive when ROE is above the required return
- Size depends on the spread, ROE minus r
- And on the equity base it is earned on
- Growth multiplies the spread, it cannot create one

IN THE LESSON

- Why does one company trade at twice book value, and another at half?
- Think of two farms.
- Each farmer reinvests her harvest into new land.
- The first farmer's new land earns fifteen per cent a year.
- The second farmer's new land earns only five per cent, and the owners could have earned ten per cent elsewhere.
- The first farmer's growth makes the owners richer.
- The second farmer's growth makes them poorer, because every extra acre is worth less than it cost.
- Residual income works exactly like that.
- It is positive when return on equity beats the required return.
- Its size depends on that spread, and on how big the equity base is, and how fast it grows.

24 The justified price to book ratio

P/B = 1 + (ROE − r) ÷ (r − g)
P/B = (ROE − g) ÷ (r − g)

Justified P/B	Value ÷ book value per share
ROE: return on equity	Constant return on equity
r: cost of equity	What owners require
g: growth in book value	Steady growth; keep below r

IN THE LESSON

- Here is the single stage version.
- Suppose return on equity stays constant, and book value grows at a steady rate g.
- Then the justified price to book ratio equals one, plus return on equity minus r, divided by r minus g.
- The same thing is return on equity minus g, over r minus g.
- The first form shows the logic: start at one and add the value of the spread.
- The second is quicker on a calculator.
- Two conditions apply.
- Return on equity must be sustainable for ever, and r must be above g, otherwise the denominator turns negative and the formula breaks.

25 Justified P/B against return on equity

Chart: Justified P/B vs Return on equity

- P/B of one
- ROE equals r
- Premium: ROE above r
- Discount

IN THE LESSON

- Here is the formula as a picture.
- The horizontal axis is return on equity, rising from three per cent on the left to fifteen on the right.
- The vertical axis is the justified price to book ratio.
- We use a required return of nine per cent and growth of three per cent.
- The rising line is the formula, and it is a straight line.
- The horizontal guide marks a ratio of one, and the vertical guide marks return on equity of nine per cent, equal to r.
- They cross exactly on the line.
- To the right, return on equity beats r and the ratio is above one, a premium.
- To the left, it is below r and the ratio is below one, a discount.

26 Example 6: does faster growth add value?

Required return 9%; justified P/B = (ROE − g) ÷ (9% − g)

ROE 13%, g 3%	10 ÷ 6	**1.67**
ROE 13%, g 5%	8 ÷ 4	**2.00**
ROE 9%, g 3% or 5%	6 ÷ 6 and 4 ÷ 4	**1.00**
ROE 6%, g 3%	3 ÷ 6	**0.50**
ROE 6%, g 5%	1 ÷ 4	**0.25**

IN THE LESSON

- Example six.
- The required return is nine per cent.
- Take a company earning a return on equity of thirteen per cent.
- With growth of three per cent, the ratio is thirteen less three, over nine less three, which is ten over six, one point six seven.
- With growth of five per cent it is eight over four, two.
- Faster growth helped.
- Now a company earning exactly nine per cent.
- The ratio is six over six, one, whatever the growth rate.
- Growth neither helps nor hurts.
- Finally a company earning six per cent.
- With growth of three per cent the ratio is three over six, half.
- With growth of five per cent it is one over four, a quarter.
- Faster growth hurt.

27 Why abnormal returns tend to fade

- High ROE attracts competition and fades towards r
- Low ROE leads to cutbacks and drifts up
- Analysts often forecast RI fading over time
- Growth adds value only if ROE is above r

IN THE LESSON

- In a competitive economy, a company that earns more than its cost of equity attracts rivals.
- New firms enter, prices fall, and the company's return on equity drifts back towards the required return.
- A company that earns less may cut back or fail, and its return drifts up.
- So in practice, analysts often forecast residual income fading over time, rather than lasting for ever.
- The common trap is to say that faster growth always raises value.
- It does not.
- Growth in book value adds value only when return on equity is above the required return.

28 Value and P/B: two sides of one equation

P/B = 1 + PV of future RI ÷ B0

Justified P/B	Value ÷ book value per share
PV of future RI	Discounted excess profit
Book value today	Equity per share on the books

IN THE LESSON

- Now the link between the model and the price to book ratio.
- Start from the residual income value, book value plus the present value of future residual income.
- Divide both sides by book value today.
- The left side becomes the justified price to book ratio.
- On the right, book value over book value is one, so the justified ratio equals one, plus the present value of future residual income divided by book value.
- If the present value is positive, the ratio is above one.
- If it is zero, the ratio is exactly one.
- If it is negative, the ratio is below one.

29 Example 7: Larkspur's justified P/B

Per share, from Example 5

Value per share	30.00 + 3.31	**33.31**
Book value per share	B0	**30.00**
Justified P/B	33.31 ÷ 30.00	**1.11**
Check via RI	1 + 3.31 ÷ 30.00	**1.11**
Market at 37.00	37.00 ÷ 30.00	**1.23**

IN THE LESSON

- We already have the numbers for Larkspur Tools.
- Value per share is thirty three thirty one.
- Book value per share is thirty.
- So the justified price to book ratio is thirty three thirty one over thirty, one point one one.
- Now the second route.
- The present value of residual income was three thirty one.
- Divided by thirty, that is point one one.
- One plus point one one is one point one one again.
- Larkspur earns more than its cost of equity for three years, so its justified ratio is above one.
- If the market price were thirty seven, the ratio would be one point two three, and the market would be paying more than the model supports.

30 What the ratio tells you

Justified P/B depends on ROE against r

Return on equity versus r	Justified P/B
ROE above r	above 1
ROE equal to r	exactly 1
ROE below r	below 1

IN THE LESSON

- Here is the rule of thumb in a small table.
- If a company is expected to earn more than its cost of equity, the present value of future residual income is positive, and the justified ratio is above one.
- If return on equity equals r, residual income is zero and the justified ratio is exactly one.
- The company's book value is worth exactly its book value.
- If return on equity is below r, the residual income is negative, and the justified ratio is below one.
- In that case a share trading below book value is not necessarily cheap.
- It may be fairly priced because the business simply earns less than its capital costs.

31 Example 8: two insurers, cheap or dear?

Both: required return 9%, growth 3%

Alder justified (ROE 12%)	1 + 0.03 ÷ 0.06	**1.50**
Alder market ÷ justified	1.30 ÷ 1.50	**0.87**
Birch justified (ROE 7%)	(0.07 − 0.03) ÷ 0.06	**0.67**
Birch market ÷ justified	0.80 ÷ 0.667	**1.20**

Alder, above book, is cheap. Birch, below book, is dear

IN THE LESSON

- Example eight.
- Two made up insurers each have a required return of nine per cent and expected growth of three per cent.
- Alder earns a sustainable return on equity of twelve per cent and trades at one point three times book.
- Birch earns seven per cent and trades at point eight times book.
- Alder's justified ratio is one, plus three over six, which is one point five.
- Market over justified is one point three over one point five, point eight seven.
- The market pays thirteen per cent less than the model supports.
- Birch's justified ratio is seven less three, over six, point six seven.
- Market over justified is point eight over point six seven, one point two.
- Birch is twenty per cent dear.

32 Justified against market

Price to book

Alder fair	**1.50**
Alder market	**1.30**
Birch fair	**0.67**
Birch market	**0.80**

Fair = justified by ROE; market = actual trading ratio

IN THE LESSON

- Here is the picture of that example.
- The vertical side is the price to book ratio.
- Look at the pairs, justified first and market second.
- For Alder, the justified bar is one point five, and the market bar is one point three.
- The market pays less than the model supports, so Alder looks cheap even though it trades above book.
- For Birch, the justified bar is point six seven, but the market bar is point eight.
- The market pays more than the model supports, so Birch looks dear, even though it trades below book.
- Being above or below one does not separate them.
- What matters is the gap between the market ratio and the one that return on equity justifies.
- And each verdict depends on the return on equity being sustainable.

33 Recap: residual income basics

- RI = (ROE − r) × opening book; EVA from NOPAT
- MVA = market value of capital less invested capital
- Value = book value + PV of future residual income
- P/B = 1 + PV of RI ÷ B0; growth helps only if ROE > r

IN THE LESSON

- Let us put it all together.
- Residual income is net income less a charge for equity, using opening book value, so it equals return on equity minus r, times opening book.
- E V A does the same for the whole firm, from N O P A T and the weighted average cost of capital.
- Market value added is the market value of capital less the capital invested, and in theory it equals the present value of future E V A.
- These measures value equity, judge managers, set pay, and read prices.
- The value of a share is book value plus the present value of residual income.
- Fundamentals are the spread between return on equity and r.
- And the justified price to book ratio follows from it.

34 Try three quick questions

1. NI 40, opening equity 250, r = 12%. Residual income?
   Answer: 40 − 0.12 × 250 = 10
2. EBIT 100, tax 30%, capital 500, WACC 8%. EVA?
   Answer: 70 − 0.08 × 500 = 30
3. ROE 15%, r 10%, g 5%. Justified P/B?
   Answer: (0.15 − 0.05) ÷ (0.10 − 0.05) = 2.0

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- Net income is forty million, opening book equity is two hundred and fifty million, and the required return is twelve per cent.
- What is the residual income?
- Twelve per cent of two hundred and fifty is thirty, and forty less thirty is ten million.
- Question two.
- E B I T is a hundred million, the tax rate is thirty per cent, invested capital is five hundred million, and the weighted average cost of capital is eight per cent.
- What is E V A?
- N O P A T is seventy, the charge is forty, so E V A is thirty million.
- Question three.
- Return on equity is fifteen per cent, r is ten, growth is five.
- What is the justified price to book ratio?
- Ten over five, which is two.