Ch. 8 Residual Income Valuation:

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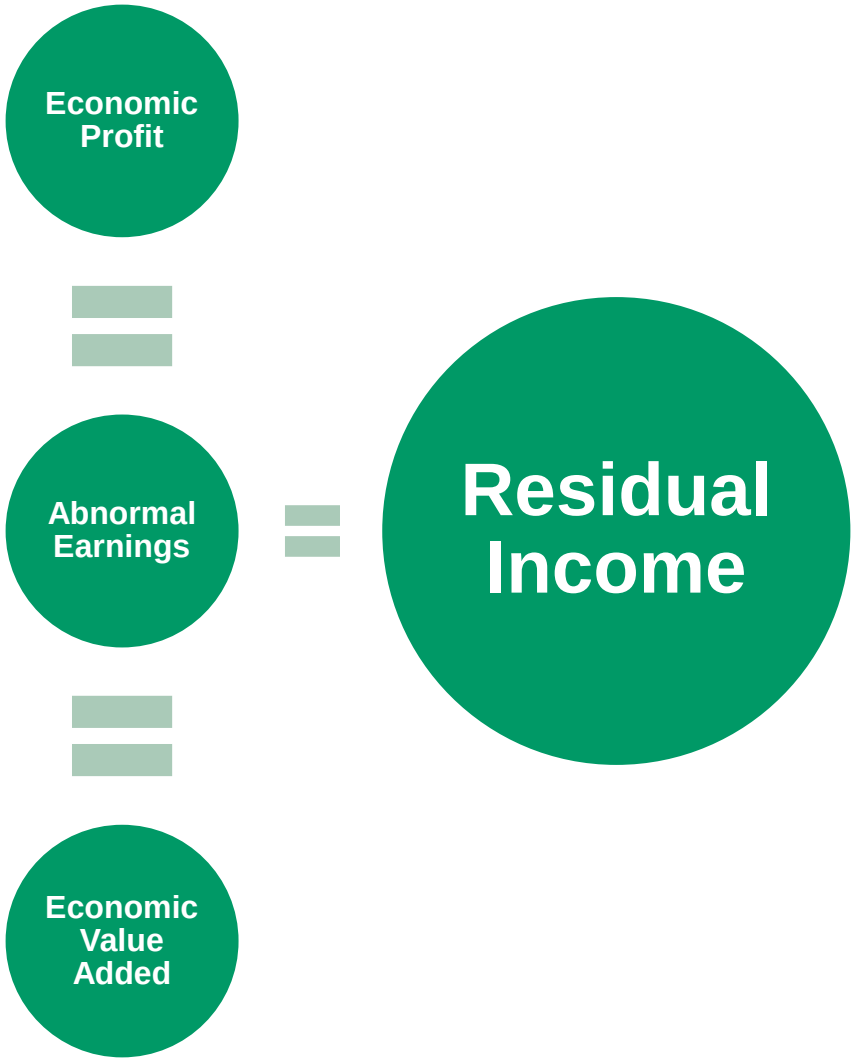
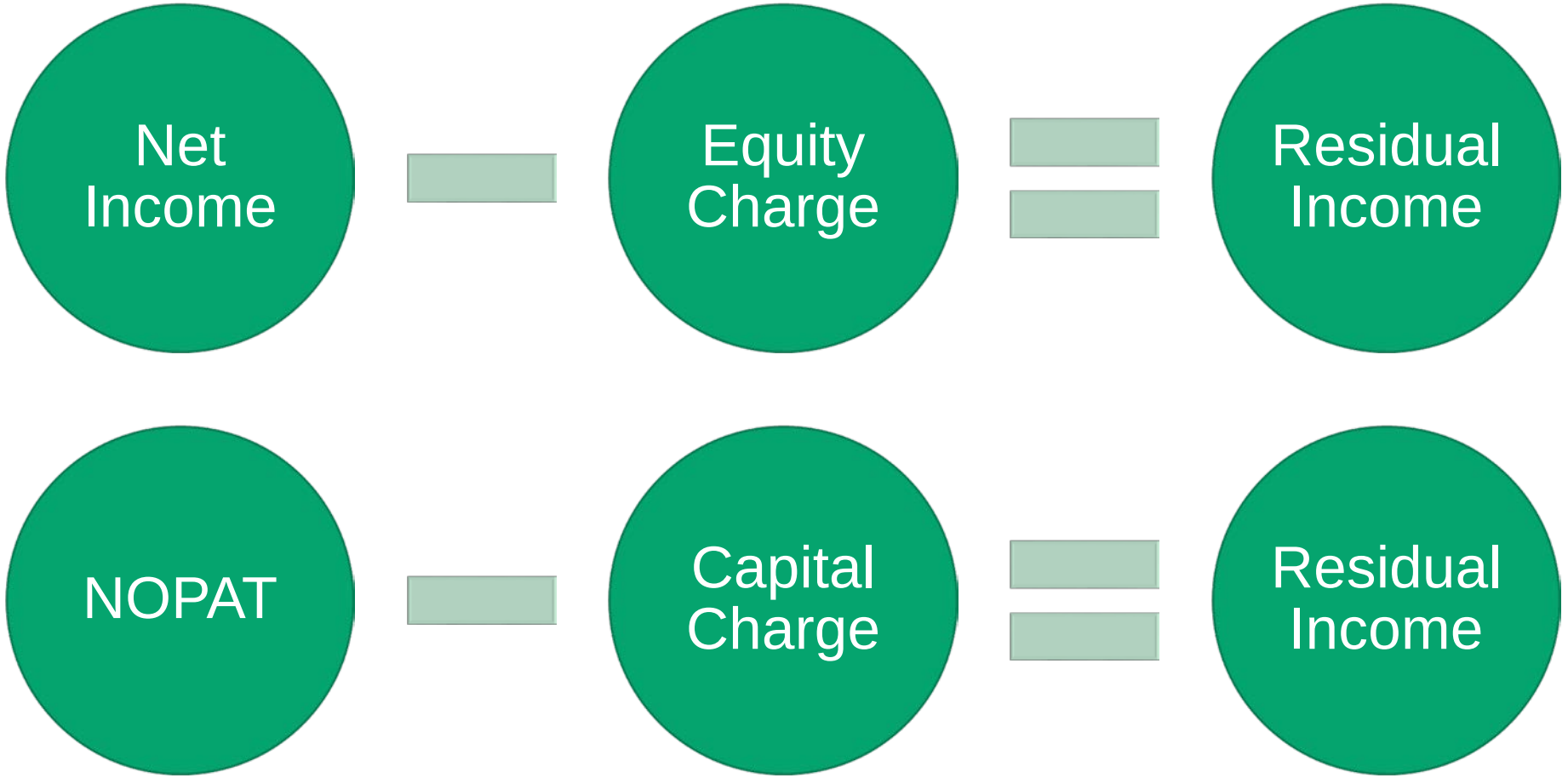
RESIDUAL INCOME



RESIDUAL INCOME



EXAMPLE: RESIDUAL INCOME

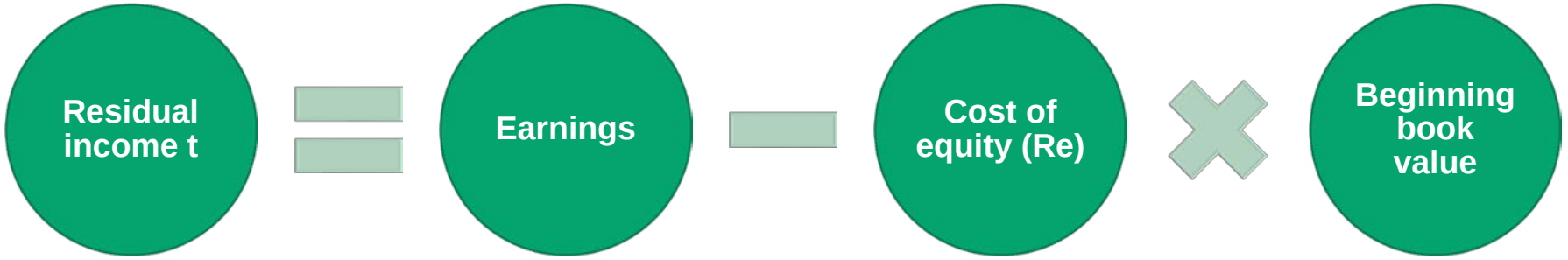
BV of Equity	$2,000,000
Cost of Equity	12%
Equity charge	$240,000
Net income	$250,000
Less equity charge	$240,000
Residual income	$10,000

USES OF RESIDUAL INCOME

- **Valuation**
- **Measuring Internal Corporate Performance**
- **Determining Executive Compensation**
- **Measuring Goodwill Impairment**

FORECASTING RESIDUAL INCOME

$$\mathrm{RI}_t = E_t - r_e B_{t-1}$$



In the context of Residual Income, the terms “Cost of equity” and “Required return on equity” have the same meaning.

EXAMPLE: FORECASTING RESIDUAL INCOME

	0	1	2
Earnings		$2.50	$3.00
Dividends		$1.00	$1.10
Book value	$20.00		
Cost of equity	10%		

EXAMPLE: FORECASTING RESIDUAL INCOME IN ONE YEAR

Charge for Equity Capital =

- Cost of equity × Beginning book value per share
- 10% × $20.00 = $2.00

Residual Income in Year 1 =

- EPS – Charge for equity capital
- $2.50 – $2.00 = $0.50

	0	1	2
Earnings		$2.50	$3.00
Dividends		$1.00	$1.10
Book value	$20		
Cost of equity	10%		

EXAMPLE: FORECASTING RESIDUAL INCOME IN TWO YEARS

End-of-Year Book Value for Year 1 =

- Beginning-of-year book value + Earnings – Dividends
- $20.00 + $2.50 – $1.00 = $21.50
- Beginning book value for Year 2

Charge for Equity Capital in Year 2 =

- Cost of equity × Beginning book value per share
- 10% × $21.50 = $2.15

Residual Income in Year 2 =

- $3.00 – $2.15 = $0.85

	0	1	2
Earnings		$2.50	$3.00
Dividends		$1.00	$1.10
Book value	$20		
Cost of equity	10%		

VALUING COMMON STOCK USING RESIDUAL INCOME

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{\mathrm{RI}_t}{(1+r)^t}$$

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{E_t - rB_{t-1}}{(1+r)^t}$$

EXAMPLE: VALUATION USING RESIDUAL INCOME

From the Previous Example:

- Beginning book value at time 0 = $20.00
- Residual income in Year 1 = $0.50
- Residual income in Year 2 = $0.85
- Cost of equity = 10%

Additionally, Assume:

- Residual income in Year 3 = $1.00
- The firm ceases operations in three years

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{1.10^3}$$

$$V_0 = \$20 + \$1.91$$

$$V_0 = \$21.91$$

CONTINUING RESIDUAL INCOME

= Long-Term Residual Income

Potential Scenarios:

- RI is constant forever
- RI is zero at the terminal period
- RI gradually declines to zero, where ROE = *r*
- RI gradually declines to a constant level, where ROE > *r*

CONTINUING RESIDUAL INCOME AND PERSISTENCE FACTORS

High Persistence

- Low dividend payout
- Historically high industry ROEs

Low Persistence

- Extreme ROE
- Extreme levels of special items
- Extreme accounting accruals

VALUING CONTINUING RESIDUAL INCOME

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{E_t - r_E B_{t-1}}{(1+r_E)^t} + \frac{E_t - r_E B_{T-1}}{(1+r_E-\omega)(1+r_E)^{T-1}}$$

Persistence Factor (ω)

- $0 \leq \omega \leq 1$
- $\omega = 1$ → Residual income will not fade
- $\omega = 0$ → Residual income will not persist after the initial forecast to rise
- $\omega = 0.62$ → It has been observed, on average, empirically

EXAMPLE: MULTISTAGE MODEL

CASE 1: $\omega = 0$

From the First Valuation Example:

- Beginning book value at Time 0 = $20.00
- Residual income in Year 1 = $0.50
- Residual income in Year 2 = $0.85
- Residual income in Year 3 = $1.00
- Cost of equity = 10%
- Value was $21.91

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{E_t - r_E B_{t-1}}{(1+r_E)^t} + \frac{E_T - r_E B_{T-1}}{(1+r_E-\omega)(1+r_E)^{T-1}}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(1+0.10-0)(1.10^2)}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(1.10)(1.10^2)}$$

$$V_0 = \$21.91$$

Now Assume:

- The firm continues operations after three years

EXAMPLE: MULTISTAGE MODEL

CASE 2: $\omega = 1.0$

From the First Valuation Example:

- Beginning book value at Time 0 = $20.00
- Residual income in Year 1 = $0.50
- Residual income in Year 2 = $0.85
- Residual income in Year 3 = $1.00
- Cost of equity = 10%
- Value was $21.91

Now Assume:

- The firm continues operations after three years

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{E_t - r_E B_{t-1}}{(1+r_E)^t} + \frac{E_T - r_E B_{T-1}}{(1+r_E-\omega)(1+r_E)^{T-1}}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(1+0.10-1.0)(1.10^2)}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(0.10)(1.10^2)}$$

$$V_0 = \$29.42$$

EXAMPLE: MULTISTAGE MODEL

CASE 3: $\omega = 0.60$

From the First Valuation Example:

- Beginning book value at Time 0 = $20.00
- Residual income in Year 1 = $0.50
- Residual income in Year 2 = $0.85
- Residual income in Year 3 = $1.00
- Cost of equity = 10%
- Value was $21.91

$$V_0 = B_0 + \sum_{t=1}^{T-1} \frac{E_t - r_E B_{t-1}}{(1+r_E)^t} + \frac{E_T - r_E B_{T-1}}{(1+r_E-\omega)(1+r_E)^{T-1}}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(1+0.10-0.60)(1.10^2)}$$

$$V_0 = \$20 + \frac{\$0.50}{1.10^1} + \frac{\$0.85}{1.10^2} + \frac{\$1.00}{(0.50)(1.10^2)}$$

$$V_0 = \$22.81$$

Now Assume:

- The firm continues operations after three years

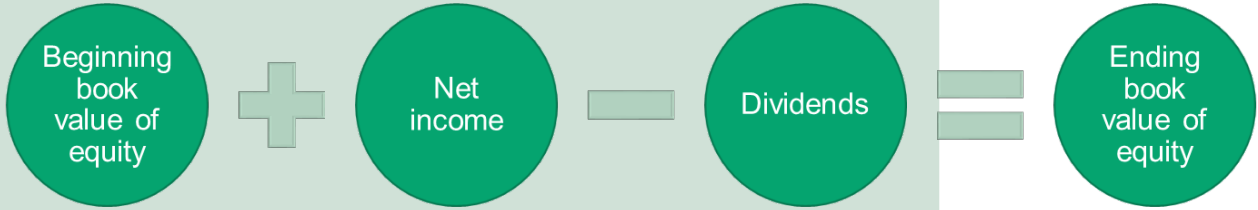
RESIDUAL INCOME MODEL
STRENGTHS AND WEAKNESSES

Strengths

- Puts less weight on the terminal value
- Uses available accounting data
- Is useful for non-dividend-paying firms
- Is useful for firms without free cash flows
- Is useful when cash flows are unpredictable
- Is based on economic value

Weaknesses

- Relies on accounting data
- May require adjustments to accounting data
- Relies on clean surplus relationship



RESIDUAL INCOME MODEL APPROPRIATENESS

Most Appropriate

- At firms where BV is accurate (financial firms)
- At non-dividend-paying firms
- At firms without free cash flows
- When terminal values are highly uncertain

Least Appropriate

- When BV is not an accurate reflection of current value
- When the clean surplus relationship does not hold