Ch. 8 Residual Income Valuation:

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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
In the context of Residual Income, the terms “Cost of equity” and “Required return on equity” have the same meaning.
### EXAMPLE: FORECASTING RESIDUAL INCOME

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Earnings</td>
<td>$2.50</td>
<td>$3.00</td>
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</tr>
<tr>
<td>Dividends</td>
<td>$1.00</td>
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<td>Book value</td>
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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

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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

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**Residual Income in Year 2 =**
- $3.00 – $2.15 = $0.85
VALUING COMMON STOCK USING RESIDUAL INCOME

\[ V_0 = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t} \]

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

<table>
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<tr>
<th>High Persistence</th>
<th>Low Persistence</th>
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<td>• Low dividend payout</td>
<td>• Extreme ROE</td>
</tr>
<tr>
<td>• Historically high industry ROEs</td>
<td>• Extreme levels of special items</td>
</tr>
<tr>
<td></td>
<td>• Extreme accounting accruals</td>
</tr>
</tbody>
</table>
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 (\(\omega\))

- \(0 \leq \omega \leq 1\)
- \(\omega = 1 \rightarrow\) Residual income will not fade
- \(\omega = 0 \rightarrow\) Residual income will not persist after the initial forecast to rise
- \(\omega = 0.62 \rightarrow\) 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

Now Assume:
- The firm continues operations after three years

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

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

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

\[
V_0 = $21.91
\]
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

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

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

\[ V_0 = \$29.42 \]
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

EXAMPLE: MULTISTAGE MODEL

CASE 3: $\omega = 0.60$

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

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

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

\[
V_0 = \$22.81
\]
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