Equity Securities

TOPIC 10: RESIDUAL INCOME VALUATION

(LECTURE EXAMPLES & SOLUTIONS ONLY)

LA TROBE UNIVERSITY

Outcome 10.1

Residual income

- David Smith is evaluating the expected residual income for ScottishPower (SPW) and has decided upon a return of 8%
- He obtains the following data from Thomson Financial as at 4 March 2002
  - Current market price GBP4.00
  - Book value per share GBP3.41
  - Consensus annual earnings estimates FY2002 GBP0.33
  - Consensus annual earnings estimates FY2003 GBP0.39
  - Annualised dividend per share GBP0.26

- **What is the forecast residual income for fiscal years ended March 2002 and March 2003?**

Outcome 10.1

Residual income

	Calculation	2002	2003
Beginning book value	BV_0	3.41	3.48
EPS forecast	E_t	0.33	0.39
Dividend forecast	D_t	0.26	0.26
Forecast book value	$BV_t = BV_0 + E_t - D_t$	3.48	3.61
Equity charge (ps)	$BV_0 \times r$	0.27	0.28
Residual income (ps)	$E_t - (BV_0 \times r)$	0.06	0.11

Outcome 10.1

Residual income model (RIM)

- Bugg Properties' expected EPS is $2.00, $2.50 and $4.00 for the next three years, respectively
- Analysts expect Bugg will pay dividends of $1.00, $1.25 and $12.25 for the next three years
- The last dividend is anticipated to be a liquidating dividend as analysts expect Bugg to cease trading after Year 3
- Bugg's current book value is $6.00 per share and its required rate of return on equity is 10%

- **Calculate per-share book value and residual income for the next three years**
- **Estimate the stock's value using the residual income model**

Outcome 10.1

Residual income

	Calculation	1	2	3
Beginning book value	BV_0	6.00	7.00	8.25
EPS forecast	E_t	2.00	2.50	4.00
Dividend forecast	D_t	1.00	1.25	12.25
Forecast book value	$BV_t = BV_0 + E_t - D_t$	7.00	8.25	0
Equity charge (ps)	$BV_0 \times r$	0.60	0.70	0.825
Residual income (ps)	$E_t - (BV_0 \times r)$	1.40	1.80	3.175

Outcome 10.1

Residual income

- The value using the residual value model is given by:

$$V_0 = 6.00 + \frac{1.40}{(1+0.10)} + \frac{1.80}{(1+0.10)^2} + \frac{3.175}{(1+0.10)^3}$$
$$= \$11.15$$

Outcome 10.4

Residual income model (RIM)

- A company will earn $1.00 per share forever
- The company pays out all its earnings as dividends
- Book value per share is $6.00
- The required rate of return on equity is 10%
- **Calculate the value of the stock using a DDM**

$$V_0 = \frac{D}{r} = \frac{1.00}{0.10} = \$10.00$$

Outcome 10.4

Residual income model (RIM)

- A company will earn $1.00 per share forever
- The company pays out all its earnings as dividends
- Book value per share is $6.00
- The required rate of return on equity is 10%
- **Calculate the value of the stock using a RIM**

$$RI_t = E_t - r \times B_{t-1} = 1.00 - (0.10)(6.00) = \$0.40$$

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t} = B_0 + \frac{RI}{r} = 6.00 + \frac{0.40}{0.10} = \$10.00$$

Outcome 10.4

Residual income model (RIM)

- A company will earn $1.00 per share forever
- The company pays out all its earnings as dividends
- Book value per share is $6.00
- The required rate of return on equity is 10%
- **Compare the recognition of value each year in the two models**
- Most of the value under the RIM is recognised much earlier than under the DDM
  - 60% of the current book value, and almost 64% is recognised in the first year, under the RIM
  - By contrast, less than 10% of the stock's value is recognised in the first year under the DDM

Outcome 10.9

Residual income model (RIM)

- Bugg Properties' expected EPS is $2.00, $2.50 and $4.00 for the next three years, respectively
- Analysts expect Bugg will pay dividends of $1.00, $1.25 and $12.25 for the next three years
- The last dividend is anticipated to be a liquidating dividend as analysts expect Bugg to cease trading after Year 3
- Bugg's current book value is $6.00 per share and its required rate of return on equity is 10%
- **Calculate per-share book value and residual income for the next three years**
- **Estimate the stock's value using the residual income model**

Outcome 10.9

Residual income

	Calculation	1	2	3
Beginning book value	BV_0	6.00	7.00	8.25
EPS forecast	E_t	2.00	2.50	4.00
Dividend forecast	D_t	1.00	1.25	12.25
Forecast book value	$BV_t = BV_0 + E_t - D_t$	7.00	8.25	0
Equity charge (ps)	$BV_0 \times r$	0.60	0.70	0.825
Residual income (ps)	$E_t - (BV_0 \times r)$	1.40	1.80	3.175

Outcome 10.9

Residual income

- The value using the residual value model is given by:

$$V_0 = 6.00 + \frac{1.40}{(1+0.10)} + \frac{1.80}{(1+0.10)^2} + \frac{3.175}{(1+0.10)^3}$$
$$= \$11.15$$

Outcome 10.9

Single stage RIM

- Joseph Yoh is evaluating a purchase of Canon Inc (CAJ)
- Current book value per share is $12.90, and the current price per share is $32.41 as at 8 February 2002
- Yoh expects long-term ROE to be 10% p.a. and long-term growth to be 8% p.a.

- **Calculate the intrinsic value of Canon stock using a RIM, assuming a cost of equity of 9% p.a.**

$$V_0 = B_0 + \frac{(ROE - r) \times B_0}{r - g}$$

$$= 12.90 + \frac{(0.10 - 0.09) \times 12.90}{0.09 - 0.08} = \$25.80$$

Outcome 10.10

Multi-stage RIM

- Semiconductor Manufacturing Ltd (TSM):
  - Has a current price of TWD61
  - Has a cost of equity of 14.33%
  - Does not pay dividends
  - Its current book value per share is TWD16.47
  - In 2001, ROE declined to 5.5%, but a rebound is expected in 2002 and 2003
  - EPS forecasts are TWD2.07 & TWD4.81 in 2002 & 2003
  - After 2003, ROE is expected to stabilise at 25% until 2011 and then to decline to 20% until 2021, after which time residual value will be zero
- **Determine whether TSM is overvalued or undervalued in the market**

Outcome 10.10

Multi-stage RIM

	Calculation	2002	2003	2004
Beginning book value	BV_0	16.47	18.54	23.35
EPS forecast	E_t	2.07	4.81	23.35 x 0.25 = 5.84
Forecast book value	$BV_t = BV_0 + E_t$	18.54	23.35	29.19
Equity charge (ps)	$BV_0 \times r$	2.36	2.65	3.35
Residual income (ps)	$E_t - (BV_0 \times r)$	-0.29	2.16	2.49
PV of RI (ps)	$RI / (1+r)^n$	-0.25	1.65	1.67

Outcome 10.10

Multi-stage RIM

	BV_0	E_t	BV_t	$BV_0 \times r$	RI	PV
BV_0						16.47
2002	16.47	2.07	18.54	2.36	-0.29	-0.25
2003	18.54	4.81	23.35	2.66	2.16	1.65
2004	23.35	5.84*	29.19	3.35	2.49	1.67
2011	111.34	27.84*	139.18	15.96	11.88	3.11
2012	139.18	27.84**	167.01	19.94	7.89	1.81
2020	598.14	119.69**	718.12	85.76	33.93	2.66
2021	718.12	143.62**	861.75	102.91	40.72	2.80
		* ROE = 25%		** ROE = 20%		59.18

Outcome 10.10

Multi-stage RIM

- **Determine whether TSM is overvalued or undervalued in the market**

- The value of the stock, based on the RIM, is TWD59.18
- Given that the price of the stock is TWD61, it is overvalued

Outcome 10.10

Multi-stage RIM

- Semiconductor Manufacturing Ltd (TSM):
  - Has a current price of TWD61
  - Has a cost of equity of 14.33%
  - Does not pay dividends
  - Its current book value per share is TWD16.47
  - In 2001, ROE declined to 5.5%, but a rebound is expected in 2002 and 2003
  - EPS forecasts are TWD2.07 & TWD4.81 in 2002 & 2003
  - After 2003, ROE is expected to stabilise at 25% until
  - 2011 and then to decline to 20% until 2021, *after which time ROE will slowly decay toward r with a persistence factor of 0.6*
- **Calculate TSM's value based on these forecasts**

Outcome 10.10

Multi-stage RIM

$$\text{Terminal Value}_{2021} = \frac{(ROE - r) \times B_{t-1}}{(1 + r - \omega)}$$

$$= \frac{(0.20 - 0.1433) \times 861.75}{(1 + 0.1433 - 0.60)} = 89.93$$

$$\text{PV of Terminal Value} = \frac{(ROE - r) \times B_{t-1}}{(1 + r - \omega)(1 + r)^{T-1}}$$

$$= \frac{89.93}{(1 + 0.1433)^{20}} = 6.18$$

Outcome 10.10

Multi-stage RIM

	BV_0	E_t	BV_t	$BV_0 \times r$	RI	PV
BV_0						16.47
2002	16.47	2.07	18.54	2.36	-0.29	-0.25
2003	18.54	4.81	23.35	2.66	2.16	1.65
2004	23.35	5.84*	29.19	3.35	2.49	1.67
2020	598.14	119.69**	718.12	85.76	33.93	2.66
2021	718.12	143.62**	861.75	102.91	40.72	2.80
TV					89.93	6.18
						65.36

* ROE = 25% ** ROE = 20%

Outcome 10.10

Multi-stage RIM

- **Calculate TSM's value based on these forecasts**
- The value of the stock, based on the RIM, is TWD65.36
- Given that the price of the stock is TWD61, it is undervalued