Ch. 5

Discounted Dividend Valuation

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DISCOUNTED CASH FLOW MODELS

Dividend Discount Models

Free Cash Flow Models

- Free cash flow to the firm
- Free cash flow to equity

Residual Income Models

CHOICE OF DISCOUNTED CASH FLOW MODELS

Dividend Discount Models	• History of dividend payments • Dividends related to earnings • Noncontrolling perspective
Free Cash Flow Models	• Small or zero dividends • Positive cash flow related to earnings • Controlling perspective
Residual Income Models	• Small or zero dividends • Negative free cash flows • High-quality accounting disclosures

VALUING COMMON STOCK USING A MULTIPERIOD DDM

$$V_0 = \sum_{t=1}^{n} \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$$

EXAMPLE: VALUING COMMON STOCK USING A MULTIPERIOD DDM

	0	1	2	3
D		$1.00	$1.05	$1.10
P				$20.00

EXAMPLE: VALUING COMMON STOCK USING A MULTPERIOD DDM

$$V_0 = \frac{\$1.00}{1.10} + \frac{\$1.05}{1.10^2} + \frac{\$21.10}{1.10^3}$$

$$V_0 = \$17.63$$

VALUING COMMON STOCK USING THE GORDON GROWTH MODEL

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

EXAMPLE: VALUING COMMON STOCK USING THE GORDON GROWTH MODEL

Risk-free rate	3.0%
Equity risk premium	6.0%
Beta	1.20
Current dividend	$2.00
Dividend growth rate	5.0%
Current stock price	$24.00

VALUING COMMON STOCK USING THE GORDON GROWTH MODEL

$$\text{CAPM: } r = 3\% + 1.2(6\%) = 10.2\%$$

$$V_0 = \frac{\$2.00(1+0.05)}{0.102-0.05} = \frac{\$2.10}{0.102-0.05} = \$40.38$$

EXAMPLE: VALUING PREFERRED STOCK

$$V_0 = \frac{\$2.00}{0.102 - 0} = \$19.61$$

EXAMPLE: CALCULATING THE IMPLIED GROWTH RATE USING THE GORDON GROWTH MODEL

Using the previous common stock example and the current stock price of $24, what is the implied growth rate?

$$\$24 = \frac{\$2.00(1+g)}{0.102-g}$$

$$2.448 - 24g = 2.00(1+g)$$

$$-26g = -0.448$$

$$g = 1.72\%$$

CALCULATING THE IMPLIED REQUIRED RETURN USING THE GORDON GROWTH MODEL

$$V_0 = \frac{D_1}{r - g}$$

$$r = \frac{D_1}{P_0} + g$$

EXAMPLE: CALCULATING THE IMPLIED REQUIRED RETURN USING THE GORDON GROWTH MODEL

Using the previous common stock example and the current stock price of $24, what is the implied required return?

$$r = \frac{D_1}{P_0} + g$$

$$r = \frac{2.10}{24} + 0.05$$

$$r = 8.75\% + 5\% = 13.75\%$$

USING THE GORDON GROWTH MODEL TO DERIVE A JUSTIFIED LEADING P/E

$$V_0 = \frac{D_1}{r - g}$$

$$\frac{P_0}{E_1} = \frac{D_1 / E_1}{r - g}$$

$$\frac{P_0}{E_1} = \frac{1 - b}{r - g}$$

USING THE GORDON GROWTH MODEL TO DERIVE A JUSTIFIED TRAILING P/E

$$V_0 = \frac{D_0(1+g)}{r-g}$$

$$\frac{P_0}{E_0} = \frac{D_0(1+g)/E_0}{r-g}$$

$$\frac{P_0}{E_0} = \frac{(1-b)(1+g)}{r-g}$$

EXAMPLE: USING THE GORDON GROWTH MODEL TO DERIVE A JUSTIFIED P/E

Stock price	$50.00
Trailing earnings per share	$4.00
Current dividends per share	$1.60
Dividend growth rate	5.0%
Required return on stock	9.0%

EXAMPLE: USING THE GORDON GROWTH MODEL TO DERIVE A JUSTIFIED LEADING P/E

$$\frac{P_0}{E_1} = \frac{1-b}{r-g}$$

$$\frac{P_0}{E_1} = \frac{\$1.60/\$4.00}{0.09-0.05} = 10.0$$

EXAMPLE: USING THE GORDON GROWTH MODEL TO DERIVE A JUSTIFIED TRAILING P/E

$$\frac{P_0}{E_0} = \frac{(1-b)(1+g)}{r-g}$$

$$\frac{P_0}{E_0} = \frac{(\$1.60 / \$4.00)(1.05)}{0.09-0.05} = 10.50$$

Actual P/E = \$50.00/\$4.00 = 12.50

ISSUES USING THE GORDON GROWTH MODEL

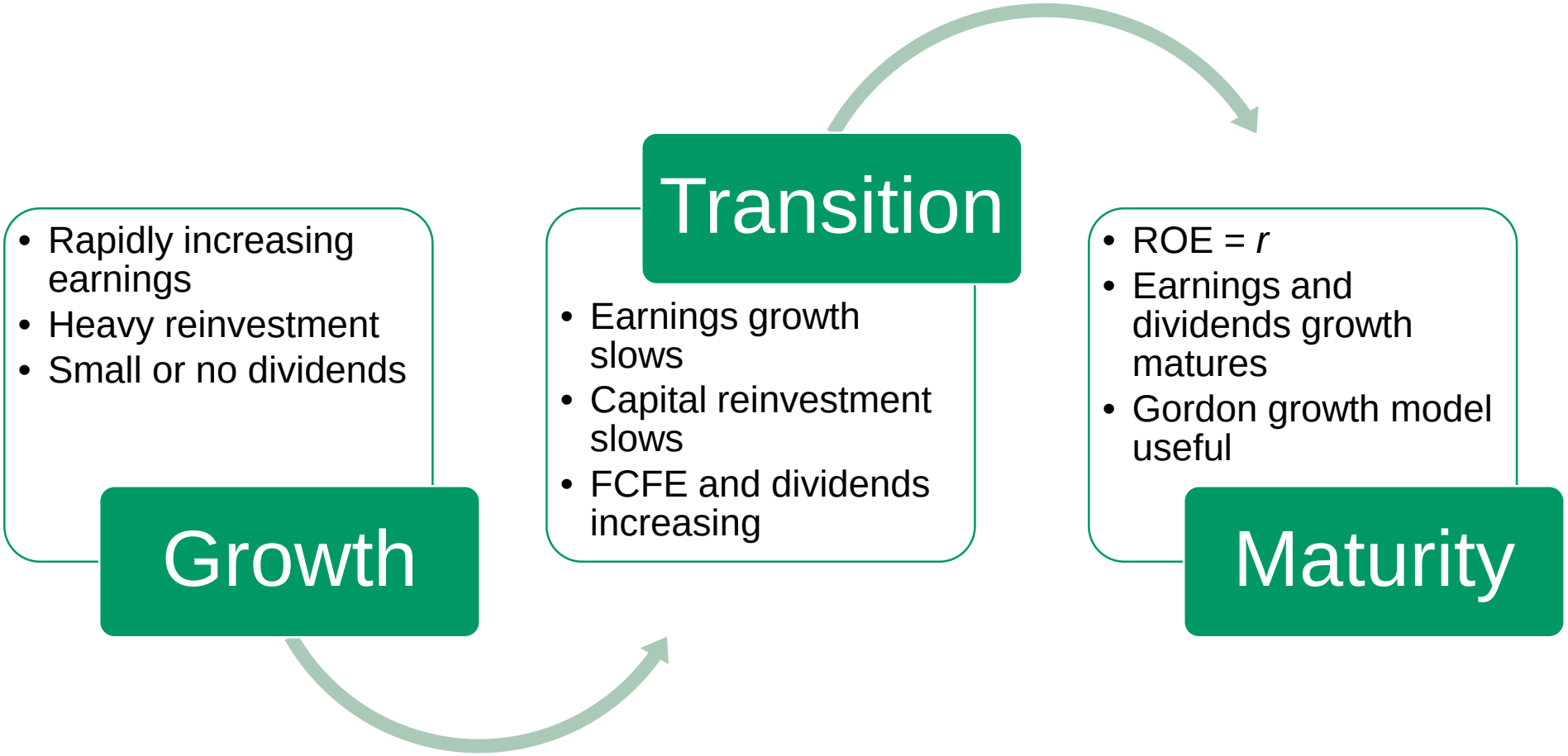
Strengths

- Simple and applicable to stable, mature firms
- Can be applied to entire markets
- *g* can be estimated using macro data
- Can be applied to firms that repurchase stock

Limitations

- Not applicable to non-dividend-paying firms
- *g* must be constant
- Stock value is very sensitive to $r - g$
- Most firms have nonconstant growth in dividends

CHOICE OF DISCOUNTED CASH FLOW MODELS



TWO-STAGE H-MODEL

$$V_0 = \frac{\left[D_0 \times \left(1 + g_L\right)\right] + \left[D_0 \times H\left(g_S - g_L\right)\right]}{r - g_L}$$

EXAMPLE: TWO-STAGE H-MODEL

Current dividend	$3.00
g_s	20%
g_L	6%
H (10 years)	5
Required return on stock	10%
Current stock price	$120

EXAMPLE: TWO-STAGE H-MODEL

$$V_0 = \frac{\left[D_0 \times \left(1 + g_L\right)\right] + \left[D_0 \times H\left(g_S - g_L\right)\right]}{r - g_L}$$

$$V_0 = \frac{\left[\$3 \times \left(1 + 0.06\right)\right] + \left[\$3 \times 5\left(0.20 - 0.06\right)\right]}{0.10 - 0.06}$$

$$V_0 = \$79.50 + \$52.50 = \$132.00$$

ESTIMATING THE GROWTH RATE

Industry or Macroeconomic Average

$g = b \times \text{ROE}$

- DuPont formula
- ROE = r
- ROE = industry ROE

THE SUSTAINABLE GROWTH RATE

THE DUPONT MODEL

$$\text{ROE} = \left(\frac{\text{Net income}}{\text{Total assets}}\right)\left(\frac{\text{Total assets}}{\text{Shareholders' equity}}\right)$$

$$\text{ROE} = \left(\frac{\text{Net income}}{\text{Sales}}\right)\left(\frac{\text{Sales}}{\text{Total assets}}\right)\left(\frac{\text{Total assets}}{\text{Shareholders' equity}}\right)$$

$$g = \left(\frac{\text{Net income} - \text{Dividends}}{\text{Net income}}\right) \times \left(\frac{\text{Net income}}{\text{Sales}}\right) \times \left(\frac{\text{Sales}}{\text{Total assets}}\right) \times \left(\frac{\text{Total assets}}{\text{Equity}}\right)$$

EXAMPLE: DUPONT MODEL

Net profit margin	5.00%
Total asset turnover	1.5
Equity multiplier	2.0
Retention ratio	60%

EXAMPLE: DUPONT MODEL

$$g = \left(\frac{\text{Net income} - \text{Dividends}}{\text{Net income}}\right) \times \left(\frac{\text{Net income}}{\text{Sales}}\right) \times \left(\frac{\text{Sales}}{\text{Total assets}}\right) \times \left(\frac{\text{Total assets}}{\text{Equity}}\right)$$

$$g = (0.60) \times (5\%) \times (1.5) \times (2.0)$$

$$g = 9.0\%$$

SUMMARY

Choice of Discounted Cash Flow Models

- Dividend discount models, free cash flow models, residual income models
- Dividend models most appropriate for
  - Mature, profitable, dividend-paying firms
  - Noncontrolling shareholder perspective

Gordon Growth Model

- Assumes constant g and $r > g$
- Applicable to mature, stable firms
- Estimated value very sensitive to $r - g$ denominator

SUMMARY

Uses of Gordon Growth Model

- Preferred stock valuation where $g = 0$
- PVGO – Value from future growth
- Justified leading and trailing P/Es
- Implied r and g

Phases of Growth

- Growth
- Transition
- Maturity

SUMMARY

Multistage Models

- General two-stage model: growth abruptly declines
- H-model: growth gradually declines
- Three-stage model: can use general or H-model

Sustainable Growth Rate

- g = Retention ratio × ROE
- DuPont analysis:
  - ROE = Profit margin × Asset turnover × Equity multiplier