15.401 Recitation

3: Common Stocks

Learning Objectives

❑ Review of Concepts
- Discounted cash flow (DCF)
- PVGO

❑ Examples
- Flancrest Enterprises
- CompuGlobalHyperMegaNet
- Globex Corporation

Review: DCF

❑ The stock price today = sum of all expected future dividends discounted at the appropriate risk-adjusted rate.

❑ Constant dividend:

$$P_0 = \frac{D}{r}$$

❑ Growing dividend ($r > g$):

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

Review: DCF

❑ Components of DCF:
  ○ **D**: dividend forecast based on historical data and future prediction
  ○ **r**: the discount rate = r_f (risk-free rate due to time value of money) + π (risk premium due to risk of dividend stream).
  ○ **g**: growth rate based on…
    • return on equity (**ROE**): earnings / book value of equity
    • plowback ratio (**b**): retained earnings / total earnings
    • **g = ROE x b**.
    • Note: *g* must be the long-run growth rate.

Review: PVGO

❑ We can separate the value of a firm into its ongoing value and value of growth opportunities:

$$P_0 = V_0 + \text{PVGO} = \frac{EPS_1}{r} + \text{PVGO}$$

❑ PVGO can be solved from the above equation, where P_o is derived from DCF.

❑ Conversely, we can find the implied rate of return on a stock given market data:

$$r = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g$$

Example 1: Flancrest Enterprises

❑ Flancrest Enterprises recently paid a dividend of $1 per share. Its dividend is expected to grow at 20% for years 1-5. Afterwards, the growth rate will slow down to 5%. If the cost of capital for Flancrest Enterprises is 15%, what is the price of its stock today?

$D =$ $\quad$ 1.2 $\qquad$ 1.2^2 $\quad$ … … $\qquad$ 1.2^5 $\quad$ $1.2^5 \times 1.05$ $\quad$ $1.2^5 \times 1.05^2$ … …

0 $\qquad$ 1 $\qquad$ 2 $\quad$ … … $\qquad$ 5 $\qquad$ 6 $\qquad$ 7 $\qquad$ … … periods
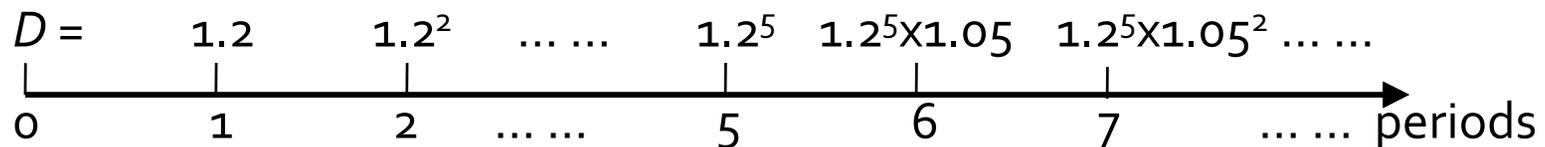
❑ What is the ex-dividend price of the stock at time 1? What is the rate of return of the stock in Year 1?

Example 1: Flancrest Enterprises

❑ Time 0:

$D =$ 1.2 1.2^2 …… 1.2^5 1.2^5x1.05 1.2^5x1.05^2 ……

0   1   2   ……   5   6   7   …… periods
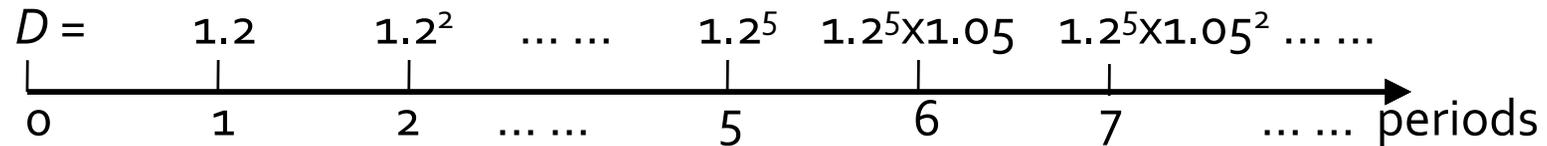
❑ PV of Year 1-5:
$$\frac{1.2}{1.15} + \frac{(1.2)^2}{(1.15)^2} + \cdots + \frac{(1.2)^5}{(1.15)^5} = 5.6912$$

❑ PV of Year 6-∞:
$$\frac{1.2^5 \cdot 1.05}{0.15 - 0.05} \cdot \frac{1}{(1.15)^5} = 12.9899$$

❑ Price:
$$5.6912 + 12.9899 = \$18.68$$

Example 1: Flancrest Enterprises

❑ Time 1:

$$D = \quad 1.2^2 \quad \cdots\cdots \quad 1.2^5 \quad 1.2^5 \text{x} 1.05 \quad 1.2^5 \text{x} 1.05^2 \cdots\cdots$$

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|-------|-------|-------|-------|-------|-------|-------|------->
0       1       2    ......   5       6       7    ......  periods
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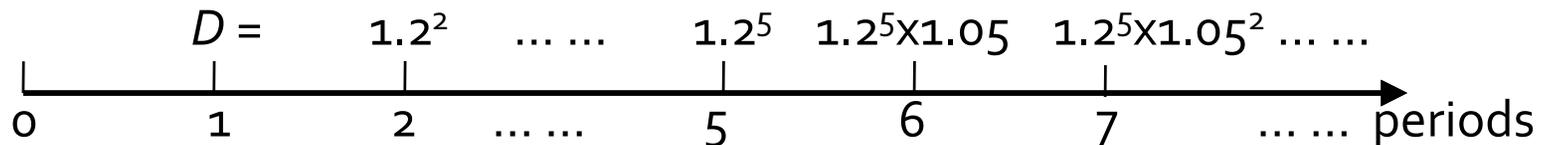
❑ PV of Year 2-5: $\dfrac{(1.2)^2}{1.15} + \dfrac{(1.2)^3}{(1.15)^2} + \cdots + \dfrac{(1.2)^5}{(1.15)^4} = 5.3449$

❑ PV of Year 6-∞: $\dfrac{1.2^5 \cdot 1.05}{0.15 - 0.05} \cdot \dfrac{1}{(1.15)^4} = 14.9384$

❑ Price: $5.3449 + 14.9384 = \$20.28$

❑ Return: $\dfrac{\$20.28 + \$1.2}{\$18.68} - 1 = 15.00\%$

Example 2: CompuGlobalHyperMegaNet

❑ CompuGlobalHyperMegaNet (CGHMN) has an EPS of $2 last year. It has a payout ratio of 25% and ROE of 10%. If investors expect a return of 10% from the firm,
  ○ What is CGHMN's stock price?
  ○ What is CGHMN's PVGO?
  ○ What is CGHMN's P/E ratio?
❑ How would the answers change if
  ○ ROE = 12%?
  ○ ROE = 9%

Example 2: CompuGlobalHyperMegaNet

- ❑ (ROE = 10%)
  - ○ $g = \text{ROE} \times b = 0.1 \times (1 - 0.25) = 0.075$

$$P_0 = \frac{D_1}{r - g} = \frac{D_0 \cdot (1 + g)}{r - g} = \frac{2 \cdot 0.25 \cdot (1 + 0.075)}{0.10 - 0.075} = \$21.50$$

  - ○

$$\text{PVGO} = P_0 - \frac{EPS_1}{r} = 21.5 - \frac{2 \cdot 1.075}{0.10} = \$0.00$$

  - ○

$$\text{PE}_0 = \frac{P_0}{EPS_1} = \frac{21.5}{2 \cdot 1.075} = 10$$

Example 2: CompuGlobalHyperMegaNet

❑ (ROE = 12%)

- ○ $g = \text{ROE} \times b = 0.12 \times (1 - 0.25) = 0.09$

$$P_0 = \frac{D_1}{r-g} = \frac{D_0 \cdot (1+g)}{r-g} = \frac{2 \cdot 0.25 \cdot (1+0.09)}{0.10 - 0.09} = \$54.50$$

- ○

$$\text{PVGO} = P_0 - \frac{EPS_1}{r} = 54.5 - \frac{2 \cdot 1.09}{0.10} = \$32.70$$

- ○

$$\text{PE}_0 = \frac{P_0}{EPS_1} = \frac{54.50}{2 \cdot 1.09} = 25$$

Example 2: CompuGlobalHyperMegaNet

❑ (ROE = 9%)

○ $g = \text{ROE} \times b = 0.09 \times (1 - 0.25) = 0.0675$

$$P_0 = \frac{2 \cdot 0.25 \cdot (1 + 0.0675)}{0.10 - 0.0675} = \$16.42$$

○

$$\text{PVGO} = P_0 - \frac{EPS_1}{r} = 16.42 - \frac{2 \cdot 1.0675}{0.10} = -\$4.93$$

○

$$\text{PE}_0 = \frac{P_0}{EPS_1} = \frac{16.42}{2 \cdot 1.0675} = 7.69$$

Example 3: Globex Corporation

❑ The dividend yield for shares of the Union Pacific Railroad is 1.9%. Security analysts are forecasting rapid growth in Globex's earnings per share (EPS), about 12.7% per year for the next three years. Does that imply an expected rate of return of 1.9 + 12.7 = 14.6%? Explain.

Example 3: Globex Corporation

❑ Answer:
  No.
  ○ EPS is only growing at 12.7% for the next three years, not forever. The expected rate of return can only increase by less than that amount.
  ○ There may be a cost to the rapid growth (e.g. part of the current earnings may be retained), so the rate of return is lowered further.

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