FIN 2004 Finance Tutorial 6 :

Stock Valuation

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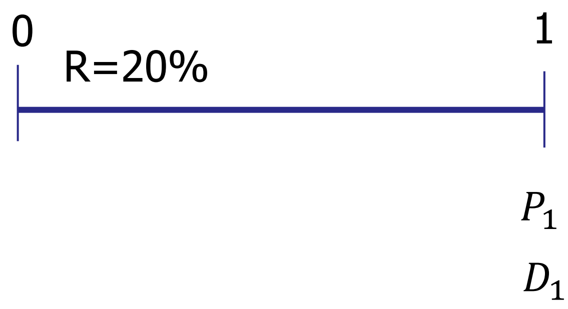
Stock Valuation: One Period Example

- Suppose you are thinking of purchasing the stock of Moore Oil, Inc.
  - You expect it to pay a $2 dividend in one year
  - You believe you can sell the stock for $14 at that time.
  - You require a return of 20% on investments of this risk
  - What is the maximum you would be willing to pay?

One-Period Example

- D_1 = \$2 dividend expected in one year
- R = 20%
- P_1 = \$14
- CF_1 = \$2 + \$14 = \$16
- Compute the PV of the expected cash flows



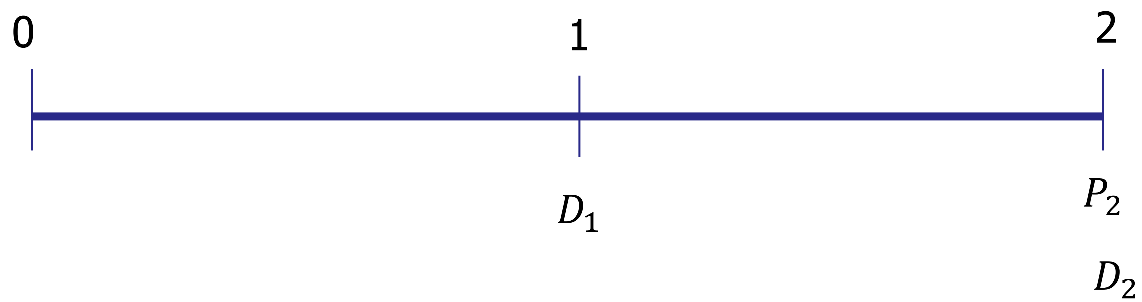
$$P_0 = \frac{(2 + 14)}{(1 + 0.20)^1} = \$13.33$$

Two-Period Example

- What if you decide to hold the stock for two years?
  - D_1 = \$2.00 CF_1 = \$2.00
  - D_2 = \$2.10
  - P_2 = \$14.70

  CF_2 = \$2.10 + \$14.70 = \$16.80
  - Now how much would you be willing to pay?

$$P_0 = \frac{2}{(1+0.20)^1} + \frac{(2.10+14.70)}{(1+0.20)^2} = \$13.33$$



Stock Value = PV of Dividends

$$\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \cdots . + \frac{D_\infty}{(1+R)^\infty}$$

$$\hat{P}_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+R)^t}$$

How can we estimate all future dividend payments?

Dividend Discount Models

- The dividend discount model while theoretically correct, suffers form two problems :
  1. Dividends must be forecasted into eternity
  2. A discount rate appropriate for the risk associated with the stock must be chosen

The Constant Growth DDM

- When dividends are expected to grow at a constant rate g over time, the model is simplified to :

$$\hat{p}_0 = \frac{D_1}{(R - g)} = \frac{D_0(1 + g)}{(R - g)}$$

Also known as Gordon Growth Model

This is a growing perpetuity formula

where

D_1 = dividend expected to be received at the end of year 1 (or next year)

g = constant growth rate of dividends

R = required rate of return (discount rate) > g

The constant growth dividend discount model is only suitable for valuing mature companies with well established dividend policies whose growth rates are no larger than their required return on equity.

Constant Growth Model Conditions

1. Dividend expected to grow at g forever
2. Stock price expected to grow at g forever

   $P_t = P_{t-1}(1+g)$

3. Expected dividend yield is constant

   $$\frac{D_1}{P_0} = \frac{D_1(1+g)}{P_0(1+g)} = \frac{D_2}{P_1}$$

4. Expected capital gains yield is constant and equal to g;

   $P_0 = \frac{D_1}{R-g}$; $R = \frac{D_1}{P_0} + g$

5. Expected total return, R, must be > g
6. Expected total return (R):

   = expected dividend yield (DY)

   + expected growth rate (g)

   = dividend yield + g

Non-constant + Constant growth

$$\boxed{\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \cdots + \frac{D_n}{(1+R)^n}} + \boxed{\frac{P_n}{(1+R)^n}}$$

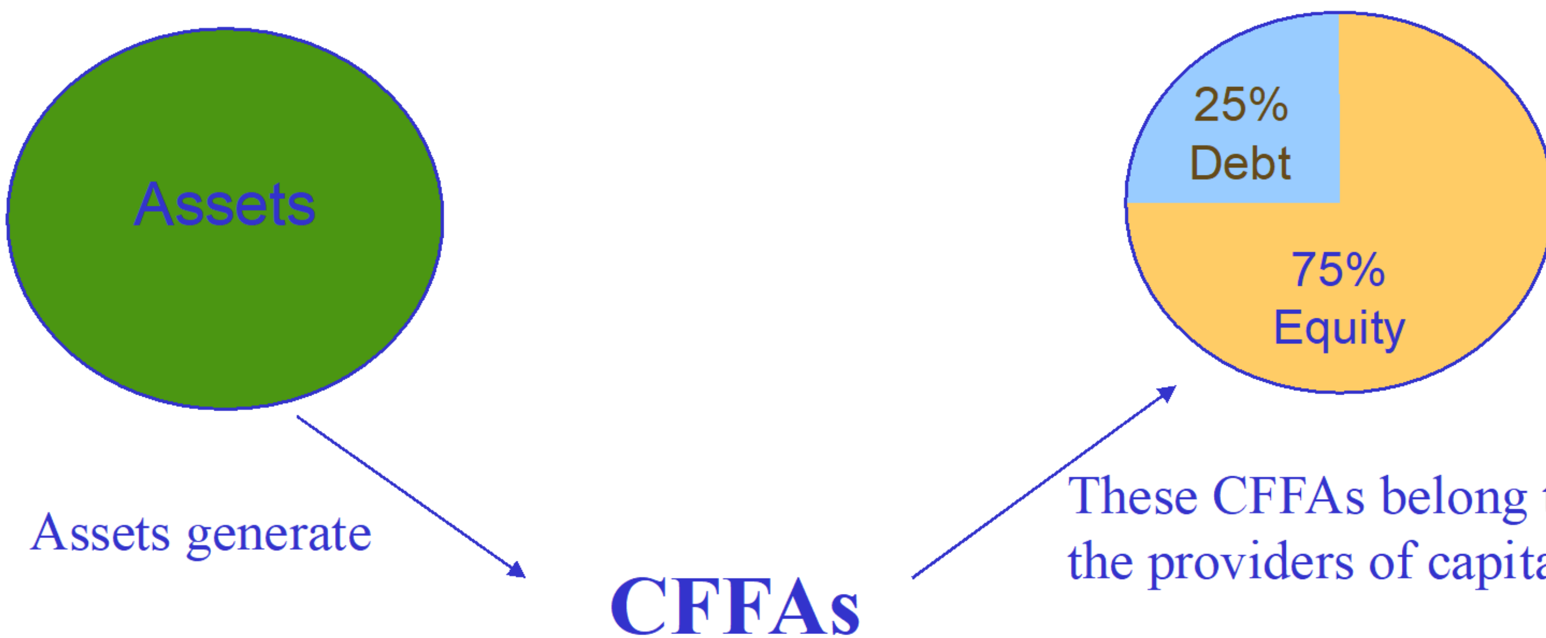
Because $\quad P_n = \sum_{t=n}^{\infty} \frac{D_{t+1}}{(1+R)^t}$

If g constant after $t = n$, then

$$P_n = \frac{D_{n+1}}{R - g}$$

Corporate Value Model

- These projected CFFAs are cash flows expected to be generated by the firm and belonging to all the firm's providers of capital). Thus they are to be discounted back by the firm's cost of capital WACC (weighted average cost of capital). In subsequent classes we will discuss this WACC and how it weights the firm's cost of equity r_E as well as its cost of debt r_D)



CFFAs are the cash flows *generated* by a firm's operating assets for a given period, *after* taking into account investment needed in fixed assets and working capital. Thus its cash *available* to the providers of capital

Corporate Value Model

$$\text{Firm value} = \sum_{t=1}^{\infty} \frac{\text{FCFF}_t}{(1 + \text{WACC})^t}$$

If the FCFF_1 is growing at a constant rate forever, then

$$\text{Firm Value} = \text{PV}_{t=0} = \frac{\text{FCFF}_1}{\text{R} - \text{g}}$$

$$\text{Equity Value} = \text{Firm value} - \text{MV of Debt}$$

$$\text{Value per share} = \frac{\text{Equiy Value}}{\text{Total number of shares outstaning}}$$

Corporate Value Model: Example

You must estimate the intrinsic value of Vits Technologies' stock. Vits's end-of-year free cash flow (FCF) is expected to be $25 million, and it is expected to grow at a constant rate of 8.5% a year thereafter. The company's WACC is 11%. Vits has $200 million of long-term debt plus preferred stock, and there are 30 million shares of common stock outstanding. What is Vits' estimated intrinsic value per share of common stock?

$$\text{Firm Value} = \frac{\text{FCFF}_1}{\text{WACC} - \text{g}} = \frac{\$25\text{M}}{0.11 - 0.085} = \$1{,}000\text{M}$$

$$\begin{aligned}\text{Equity Value} &= \text{Firm Value} - (\text{Debt plus preferred stock}) \\ &= \$1{,}000\text{M} - \$200\text{M} = \$800\text{M}\end{aligned}$$

$$\text{Value per share} = \frac{\$800}{30} = \$26.67$$

#1:

A substantial percentage of the companies listed on the NYSE and NASDAQ don’t pay dividends, but investors are nonetheless willing to buy shares in them. How is this possible?

Investors believe that even though the companies are not paying dividends but retained the net income for future expansion, they will eventually start paying dividends (or be sold to another company).

#2:

Suppose a company has a preferred stock issue and a common stock issue. Both have just paid a $2 dividend. Which do you think will have a higher price, a share of the preferred or a share of the common?

The common stock probably has a higher price because the dividend can grow, whereas it is fixed on the preferred stock.

However, the preferred stock is less risky because of the dividend and liquidation preference, so it is possible the preferred stock could be worth more, depending on the circumstances.

#3:

The Jackson-Timberlake Wardrobe Co. just paid a dividend of \$1.95 per share on its stock. The dividends are expected to grow at a constant rate of 6% per year, indefinitely. If investors require a 11% return on The Jackson-Timberlake Wardrobe Co. stock, what is the current price? What will the price be in three years? In 15 years

The constant dividend growth model is:

$P_t = D_t (1 + g)/(R – g)$

So the price of the stock today is:

$P_0 = D_0 (1 + g)/(R – g) = \$1.95 (1.06)/(0.11 – 0.06) = \$41.34$

$P_3 = D_3 (1 + g)/(R – g) = D_0 (1 + g)^4/(R – g)$

$= \$1.95 (1.06)^4/(0.11 – 0.06) = \$49.24$

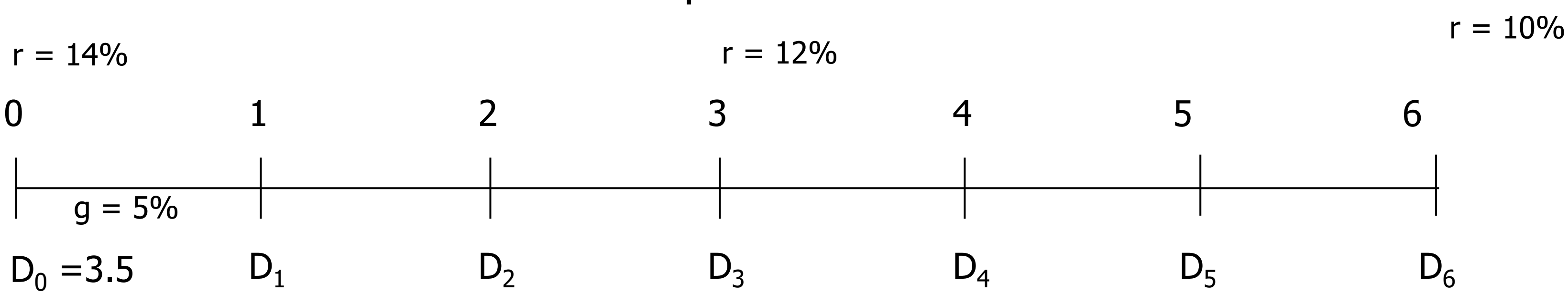
We can do the same thing to find the dividend in Year 16, which gives us the price in Year 15, so:

$P_{15} = D_{15} (1 + g) / (R – g) =$

$D_0 (1 + g)^{16} / (R – g) = \$1.95 (1.06)^{16} / (0.11 – 0.06) = \$99.07$

#4:

Great Pumpkin Farms (GPF) just paid a dividend of $3.50 on its stock. The growth rate in dividends is expected to be a constant 5 percent per year, indefinitely. Investors require a 14% return on the stock for the first three years, a 12% return for the next three years, and then a 10% return thereafter. What is the current share price GPF stock?



This stock has a constant growth rate of dividends, but the required return changes twice. To find the value of the stock today, we will begin by finding the price of the stock at Year 6, when both the dividend growth rate and the required return are stable forever. The price of the stock in Year 6 will be the dividend in Year 7, divided by the required return minus the growth rate in dividends. So:

$$P_6 = D_6\,(1 + g) / (R - g)$$

$$= D_0\,(1 + g)^7 / (R - g)$$

$$= \$3.50\,(1.05)^7 / (0.10 - 0.05) = \$98.50$$

Now we can find the price of the stock in Year 3. We need to find the price here since the required return changes at that time. The price of the stock in Year 3 is the PV of the dividends in Years 4, 5, and 6, plus the PV of the stock price in Year 6. The price of the stock in Year 3 is:

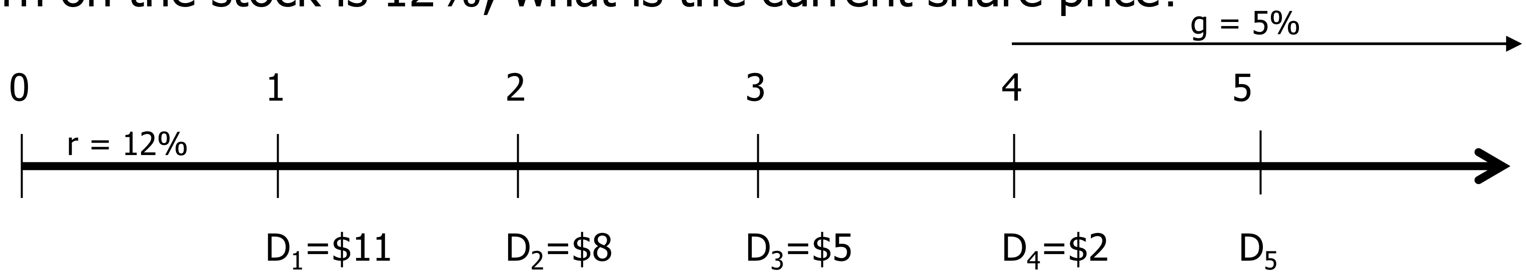
$P_3 = \$3.50(1.050)^4/1.12 + \$3.50(1.050)^5/1.12^2 + \$3.50(1.050)^6/1.12^3 + \$98.50/1.12^3 = \$80.81$

Finally, we can find the price of the stock today. The price today will be the PV of the dividends in Years 1, 2, and 3, plus the PV of the stock price in Year 3. The price of the stock today is:

$P_0 = \$3.50(1.050)/1.14 + \$3.50(1.050)^2/(1.14)^2 + \$3.50(1.050)^3/(1.14)^3 + \$80.81/(1.14)^3 = \$63.47$

#5:

Far Side Corporation is expected to pay the following dividends over the next four years : \$11, \$8, \$5, and \$2. Afterwards, the company pledges to maintain a constant 5% growth rate in dividends, forever. If the required return on the stock is 12%, what is the current share price?



With supernormal dividends, we find the price of the stock when the dividends level off at a constant growth rate, and then find the PV of the future stock price, plus the PV of all dividends during the supernormal growth period. The stock begins constant growth in Year 4, so we can find the price of the stock in Year 4, one year before the constant dividend growth begins, as:

$P_4 = D_5/(R - g) = \$2.00\ (1.05)/(0.12 - 0.05) = \$30.00$

The price of the stock today is the PV of the first four dividends, plus the PV of the Year 4 stock price. So, the price of the stock today will be:

$P_0 = \$11.00/1.12 + \$8.00/1.12^2 + \$5.00/1.12^3 + \$2.00/1.12^4 + \$30.00/1.12^4 = \$40.09$

#6:

Antiques R Us is a manufacturing firm. The company just paid a $10.46 dividend, but management expects to reduce the payout by 4 percent per year indefinitely. If you require an 11.5 percent return on this stock, what will you pay for a share today?

The constant growth model can be applied even if the dividends are declining by a constant percentage, just make sure to recognize the negative growth. So, the price of the stock today will be:

$$P_0 = D_0 (1 + g)/(R – g)$$

$$P_0 = \$10.46(1 – 0.04)/[(0.115 – (–0.04)]$$

$$P_0 = \$64.78$$

#7:

Consider four different stocks, all of which have a required return of 19% and a most recent dividend of $4.50 per share. Stocks W, X, and Y are expected to maintain constant growth rates in dividends for the foreseeable future of 10%, 0%, and -5% per year, respectively.

Stock Z is a growth stock that will increase its dividend by 20% for the next two years and then maintain a constant 12% growth rate, thereafter. What is the dividend yield for each of these four stocks? What is the expected capital gains yield? Discuss the relationship among the various returns that you find for each of these stocks.

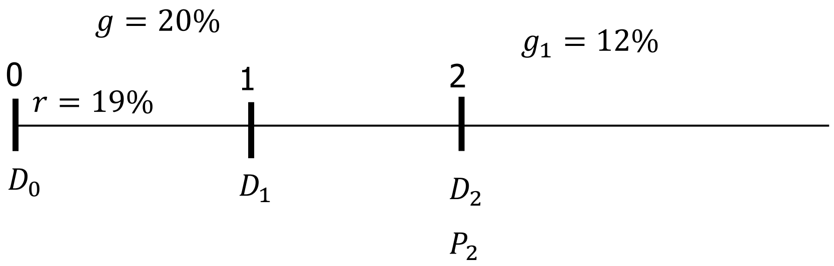
We are asked to find the dividend yield and capital gains yield for each of the stocks. All of the stocks have a 19 percent required return, which is the sum of the dividend yield and the capital gains yield. To find the components of the total return, we need to find the stock price for each stock. Using this stock price and the dividend, we can calculate the dividend yield. The capital gains yield for the stock will be the total return (required return) minus the dividend yield.

W: $P_0 = D_0(1 + g) / (R – g) = \$4.50(1.10)/(0.19 – 0.10) = \$55.00$
Dividend yield $= D_1/P_0 = \$4.50(1.10)/\$55.00 = 0.09$ or 9%
Capital gains yield = 0.19 – 0.09 = 0.10 or 10%

X: $P_0 = D_0(1 + g) / (R – g) = \$4.50/(0.19 – 0) = \$23.68$
Dividend yield $= D_1/P_0 = \$4.50/\$23.68 = 0.19$ or 19%
Capital gains yield = 0.19 – 0.19 = 0%

Y: $P_0 = D_0(1 + g) / (R – g) = \$4.50(1 – 0.05)/(0.19 + 0.05) = \$17.81$
Dividend yield $= D_1/P_0 = \$4.50(0.95)/\$17.81 = 0.24$ or 24%
Capital gains yield = 0.19 – 0.24 = –0.05 or –5%

Note that the g is also equal to capital gain yield



Z: $P_2 = D_2(1 + g)/(R - g) = D_0(1 + g_1)^2(1 + g_2)/(R - g_2)$

$= \$4.50(1.20)^2(1.12)/(0.19 - 0.12) = \$103.68$

$P_0 = \$4.50\ (1.20)/(1.19) + \$4.50\ (1.20)^2/(1.19)^2 + \$103.68/(1.19)^2 = \$82.33$

Dividend yield = $D_1/P_0 = \$4.50(1.20)/\$82.33 = 0.066$ or 6.6%

Capital gains yield = 0.19 – 0.066 = 0.124 or 12.4%

In all cases, the required return is 19%, but the return is distributed differently between current income and capital gains.

High growth stocks have an appreciable capital gains component but a relatively small current income yield.

Conversely, mature, negative-growth stocks provide a high current income but also price depreciation over time.

#8:

The risk-free rate is an annual rate of 6 percent, and the market return is an annual rate of 12 percent. Stock A is expected to generate a constant dividend of $5.20 per share. A toxic spill results in a lawsuit and potential fines, and the beta of the stock increases by 25%. Consequently, the equilibrium price of the stock falls by 12%. Assume that dividends remain unchanged, what is the new equilibrium price of the Stock A?

CAPM: $r = r_F + \beta(r_M - r_F)$

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

Solution:

Let old beta of stock be β_0.

Old required return = 6% + β_0 (12%-6%) = 6%(1+β_0)

Old Equilibrium Price= $\frac{D_1}{r}$ = $5.20/[6%(1+$\beta_0$)] = $86.67/(1+$\beta_0$)

New required return = 6% + 1.25β_0 (12%-6%) = 6%(1+1.25β_0)

New Equilibrium Price = $5.20/[6%(1+1.25$\beta_0$)] = 86.67/(1+1.25$\beta_0$)

if the equilibrium price of the stock falls by 12%,

→ 86.67/(1+1.25β_0) = 86.67(0.88)/(1+β_0)

86.67 + 86.67β_0 = 86.67(0.88) + 86.67(0.88)(1.25β_0)

86.67(0.12) = 86.67β_0 (0.88*1.25 – 1)

→ β_0 = 1.2

New Equilibrium price = 86.67/[1+1.25(1.2)] = **$34.67**