Chapter 6 - Common Stock Valuation

3 Common Approaches

1. Dividend Discount Models
2. Ratio Models (we will cover briefly)
3. Financial Statement Analysis (not covered in this course)

Our approach is called "Fundamental Analysis" as it analyses the fundamental or economic value of the company.

An alternate approach is called "Technical Analysis" which is covered in Chapter 8.

Dividend discount models use a NPV or discounted cash flow approach to valuing stocks.

Dividends are the CF's you receive from stock ownership.

In finance we discount CF's to get present value.

The value of a stock is the PV of its CF's
\[ PV = \frac{CF_1}{(1+i)} + \frac{CF_2}{(1+i)^2} + \frac{CF_3}{(1+i)^3} + \ldots \]

Two problems with this application.

1. What are the CF's?
2. What is the appropriate discount rate?

**Preferred Stock Valuation**

- Recall, preferred stock pays a fixed dividend.

\[ PV = \frac{D}{(1+i)} + \frac{D}{(1+i)^2} + \frac{D}{(1+i)^3} + \ldots \]

\[ D = \text{Dividend} \]

\[ PV = \frac{D}{i} \]

i.e., Present Value of a Perpetuity.

This works for a constant dividend.

"**Gordon Model**"

Assume that dividends increase at a constant rate \( g \). Then.

\[ D_1 = D_0(1+g) \]
\[ D_2 = D_0(1+g)(1+g) = D_0(1+g)^2 = D_1(1+g) \]
In general
\[ D_t = D_{t-1}(1+g) \]
or \[ D_t = D_0(1+g)^t \]

\[ PV = \frac{D_0(1+g)}{1+k} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \cdots \]

\[ = \frac{D_1}{k-g} = \frac{D_0(1+g)}{k-g} = S_0 \]

**Gordon DDM model**

where: \( g \) = constant dividend growth rate

\( D_t = \) dividend at time period \( t \) (i.e. next year or one year from now)

\( PV = S_0 = \) stock price (estimated) at \( t = 0 \) (i.e. today)

also: \( k > g \) to use this model

**Note:** By analogy, we can also write:

\[ S_t = \frac{D_{t+1}}{k-g} = \frac{D_t(1+g)}{k-g} \]

\( S_t = \) estimate stock price at time \( t \)
Where does g come from?

1. Historical dividends of the firm
   (this can have some problems as a predictor)

   The more of a firm's profit that it reinvests, the faster the firm will grow.

Example: If you put $100 into a bank account that earns 10% yr, how much will you have after 2 yrs if you withdraw your interest earnings each year?

   First year interest earning = $10
   Which you withdraw, leaving $100 invested.

   Second year
   Second year interest earning = $10
   Which you withdraw, leaving $100 in your account.

Note: Your account never grows if you withdraw the earnings each year. The same will happen to a firm that pays out all its earnings each year.
What happens if you withdraw 1/2 of your earnings each year?

First year interest = $1000
withdraw 5.00
reinvest 5.00

Second year interest = (105 * 0.10) = 10.50
withdraw 1/2
reinvest 5.25
reinvest 5.25

So balance in account after 2 yrs = 110.25

How fast is your account growing?

P NR = 1
I NR (FV = 110.25, PV = -100, n = 2)
I NR = 5% = growth rate

If you withdraw all of your earnings, your account does not grow. If you withdraw 1/2 your earnings, your account grows at 1/2 of the rate of interest. You can verify that if you withdraw nothing, your account grows at the interest rate the bank pays. The same is true for firm's and its reinvestment of earnings.
So we can estimate $g$ as:

$$ g = ROE \left( 1 - dpr \right) $$

$ROE = \text{firm Return on Equity}$

(a measure of the return on money reinvested in the firm)

dpr = \text{dividend payout ratio}

i.e. the fraction of a firm's earnings that are paid out as a dividend.

If $dpr = 0$ (i.e. the firm does not pay a dividend such as Microsoft used to not pay a dividend) then

$$ g = ROE $$

And if $dpr = 1$ then $g = 0$

Where does $k$ come from?

Typically use the CAPM (Chapter 12)

$$ k = R_f + \beta \left[ E(R_m) - R_f \right] $$

$$ k = R_f + \beta \left[ \text{Market Risk Premium} \right] $$

$\beta$ = measures the firm's systematic risk relative to the market.
Multiple growth rate dividend discount model.

- The common approach is to use terms by terms discounting until the firm has a constant growth rate. At that point use the Gordon model.

Price Ratio Analysis

- Analysts compute ratios of price to income and asset measures.

P ratio is called Price Earnings ratio

- The inverse is the E/P ratio which is like the interest rate earned by the company's stock.

- One shortcoming of using P/E for stock price analysis is that it does not directly consider the potential for capital gains.
Chapter continued

If a stock has a high potential for capital gains we would accept a low yield (i.e. a high P/E ratio). Such stocks are called growth stocks.

Value stocks have high earnings and thus low capital gains and lower P/E ratios. Much of their investors return is from earnings rather than capital gains.

Another ratio that is also looked at is Price to Cash Flow P/F

This "unwinds" the effect of depreciation or other non cash charges (expense).

Simple Version

CF = Net Income Plus Depreciation

So, "earnings" are reduced by depreciation so high depreciation means low earnings even if cash flow is strong.

When CF > Earnings, it's not accounting tricks that produced the earnings so they are said to be "quality earnings."
ROE = 15% = 0.15

Retention ratio = 40%

(Note: dpr = 1 - retention ratio)

\[ g = ROE \times (1-dpr) \]
\[ = ROE \times Retention \ Ratio \]
\[ = 0.15 \times 0.40 = 0.06 = 6\% \]

\[ S_0 = \frac{D_0(1+g)}{k-g} \]

\[ D_0 = dpr \times E_0 \]

\[ S_0 = \frac{(dpr \times E_0)(1+g)}{k-g} \]

\[ \frac{P}{E} = \frac{S_0}{E_0} = \frac{dpr(1+g)}{k-g} = \frac{0.5(1.1)}{0.15 - 0.10} = \frac{0.55}{0.05} = 11 \]
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\[ S_0 = \frac{D_f}{k-g} \]

by analogy \( S_2 = \frac{D_3}{k-g} \)

\[ g = (1 - dpr) \times ROE \]
\[ = (1 - 0.4) \times 0.15 \]
\[ = 0.6 \times 0.15 = 0.09 \]

\[ S_2 = \frac{2 \times 66.67}{0.12 - 0.09} = \frac{2}{0.03} = 66.67 \]

\[ S_0 = \frac{S_2}{(1+k)^2} \times \frac{66.67}{(1.12)^2} = 53.15 \]

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\[ S_0 = \frac{D_f}{k-g} = \frac{2}{0.12 - 0.5} = \frac{2}{0.07} = 28.57 \]
#14  p 209  \[ D_0 = 1 \quad k = .15 \quad g = .05 \]

First verify \[ S_0 = 10 \]

\[ S_0 = \frac{D_0}{k-g} = \frac{1}{.15-.05} = \frac{1}{.10} = 10 \]

\[ S_2 = \frac{D_2}{k-g} = \frac{D_1(1+g)^2}{k-g} \]

\[ S_2 = S_0(1+g)^2 = 10(1.05)^2 = 11.03 \]

#18 Using P/E ratio to value a stock:

\[ P = \frac{P}{E} \times E \]

\[ \frac{P}{E} = 26 \quad EPS = 43.5 \]

\[ P = 26 \times 43.5 = 1131 \]
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\[ S_0 = 80 \quad D_0 = 4.10 \quad g = 0.04 \quad k = ? \]

\[ S_0 = \frac{D_0}{k-g} \]

\[ 80 = \frac{4.10}{k-0.04} \]

\[ k-0.04 = \frac{4.10}{80} \]

\[ k = \frac{4.10}{80} + 0.04 \]

\[ = 0.0513 + 0.04 = 0.0913 = 9.13\% \]

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\[ D_0 = 1.8 \quad S_0 = 30 \quad k = 0.13 \quad g = ? \]

\[ S_0 = \frac{D_0(1+g)}{k-g} = 30 = \frac{1.8(1+g)}{0.13-0.09} \]

\[ 30(0.13-0.09) = 1.8 + 1.8g \]

\[ 3.9 - 30g = 1.8 + 1.8g \]

\[ 3.9 - 1.8 = 30g + 1.8g \]

\[ 2.1 = 31.8g \]

\[ \frac{2.1}{31.8} = g = 0.066 = 6.6\% \]