

## Valuing common stocks

Application of the DCF approach

**TIP**

If you do not understand something, ask me!

## The plan of the lecture

- ⌘ **Review what we have accomplished in the last lecture**
- ⌘ **Some terms about stocks**
- ⌘ **Valuing stocks using**
  - ☑ Dividend growth model
  - ☑ Corporate value model
  - ☑ the multiples of comparable firms

2

## What have we accomplished?

- ⌘ PV concepts
- ⌘ Discount rates
- ⌘ NPV rules for taking a project
- ⌘ The formula for calculating perpetuity and annuity
- ⌘ Compounding interest rate

3

## Some terms about stocks

Common Stock - Ownership shares in a publicly held corporation.

Book Value - Total common equity on the balance sheet.

Market Value - Stock price per share \* # of shares outstanding.

4

## Some terms about stocks

Dividend - Periodic cash distribution from the firm to the shareholders.

P/E Ratio - Stock Price per share divided by earnings per share (EPS).

Dividend yield - Dividends per share (DPS) over the stock price of per share

5

## Facts about common stock

- ⌘ Represents ownership
- ⌘ Ownership implies control
- ⌘ Stockholders elect directors
- ⌘ Directors elect management
- ⌘ Management's goal: Maximize the stock price

6

## Types of stock market transactions

- ⌘ Initial public offering market (“going public”) (Company sells shares to the public for the 1<sup>st</sup> times.)
- ⌘ Primary market (Company sells shares to the public for the 2nd, 3rd,...times.)
- ⌘ Secondary market (stockholders sell shares to each other)

7

## Stock Market Reporting

52 WEEKS		STOCKSYM	YLD		VOL	NET			
HI	LO		DIV	%	PE	HI	LO	CLOSE	CHG
52.75	19.06	Gap Inc	0.09	0.5	15	20.50	19	19.25	-1.75

Gap has been as high as \$52.75 in the last year. Gap pays a dividend of 9 cents/share. Given the current price, the dividend yield is ½ %.

Gap has been as low as \$19.06 in the last year. Given the current price, the PE ratio is 15 times earnings.

Gap ended trading at \$19.25, down \$1.75 from yesterday's close. 6,517,200 shares traded hands in the last day's trading.

8

## Expected return

Expected Return - The percentage return that an investor forecasts from a specific investment over a set period of time.

At this stage, you do not need to distinguish between expected return and the discount rate.

$$\text{Expected Return} = r = \frac{\text{Div}_1 + P_1 - P_0}{P_0}$$

9

## Expected Return

The formula for the expected return can be broken into two parts:

$$\text{Expected return} = \text{Dividend Yield} + \text{Capital Appreciation Yield}$$

$$\text{Expected Return} = r = \frac{\text{Div}_1}{P_0} + \frac{P_1 - P_0}{P_0}$$

10

## Example

If Fledgling Electronics is selling for \$100 per share today and is expected to sell for \$110 one year from now, what is the expected return if the dividend one year from now is forecasted to be \$5.00?

$$\text{Expected Return} = \frac{5 + 110 - 100}{100} = .15$$

11

## Example

⌘ Jennifer has bought one IBM share in the beginning of this year and decides to hold this share until next year. The expected dividend this year is \$10 per share and the stock is expected to sell at \$110 per share in the end of the year. If the discount rate is 10%, what is the current stock price?

$$P = (110 + 10) / (1 + 0.1) = \$109.1$$

12

## Valuing Common Stocks using dividends

Stock value equals the present value of all expected future dividends plus the selling price of the stock.

$$P_0 = \frac{Div_1}{(1+r)^1} + \frac{Div_2}{(1+r)^2} + \dots + \frac{Div_H + P_H}{(1+r)^H}$$

H - Time horizon for your investment.

13

## Valuing common stocks using dividends

### Example

Current forecasts for XYZ Company's dividends are \$3, \$3.24, and \$3.50 over the next three years, respectively. At the end of three years you anticipate selling your stock at a market price of \$94.48. What is the price of the stock now given a 12% discount rate?

14

## Solution

$$P = \frac{3.00}{(1+.12)^1} + \frac{3.24}{(1+.12)^2} + \frac{3.50 + 94.48}{(1+.12)^3}$$

$$P = \$75.00$$

15

## Valuing common stocks using dividends

If we forecast no dividend growth, and plan to hold out stock indefinitely, we will then value the stock as the PV of a **PERPETUITY**.

$$PV(\text{perpetuity}) = P = \frac{Div_1}{r} \text{ or } \frac{EPS_1}{r}$$

Assumes all earnings are paid to shareholders.

16

## Example

⌘ Suppose that a stock is going to pay a dividend of \$3 every year forever. If the discount rate is 10%, what is the current stock price for the following cases:

- ☑ (a) you invest and hold it forever?
- ☑ (b) you invest and hold it for two years?
- ☑ (c) you invest and hold it for 20 years?

17

## Solution

$$\text{⌘ (a) } P_0 = 3/0.1 = \$30$$

$$\begin{aligned} \text{⌘ (b) } P_0 &= PV(\text{annuity}) + PV(\text{the stock price at year 2}) \\ &= 3/1.1 + 3/1.1^2 + (3/0.1)/1.1^2 \\ &= 3/0.1 = \$30 \end{aligned}$$

$$\begin{aligned} \text{(c) } P_0 &= PV(\text{annuity of 20 years}) + \\ &PV(\text{the stock price at the year of 20}) \\ &= \$30 \end{aligned}$$

18

## Conclusion

- ⌘ The stock price does not depend on how long you intend to hold it!

19

## Dividend growth model

- ⌘ Since the stock value does not depend on the investment horizon, let's assume the investor will hold onto it forever.
- ⌘ So, value of a stock is the present value of all future dividends expected to be generated by the stock.

$$P = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \dots + \frac{D_\infty}{(1+r)^\infty}$$

20

## Constant growth stock

- ⌘ A stock whose dividends are expected to grow forever at a constant rate,  $g$ .

$$D_1 = D_0 (1+g)^1$$

$$D_2 = D_0 (1+g)^2$$

$$D_t = D_0 (1+g)^t$$

21

## I: Dividend Growth Model

Under the assumption that dividends grow at a constant rate, stocks can be valued as a perpetuity with a growth rate, (still remember the PV of a growth perpetuity?) that is

$$P = \frac{Div_1}{r - g}$$

22

## What happens if $g > r$ ?

- ⌘ If  $g > r$ , the constant growth formula leads to a negative stock price, which does not make sense.

23

## Example

- ⌘ Suppose that a stock is going to pay a dividend of \$3 next year. Dividends grow at a growth rate of 3%. If the discount rate is 10%, what is the stock price?

24

## Solution

$$\text{⌘ } P = 3 / (0.1 - 0.03) = \$42.86$$

⌘ Will the stock value change if you plan to

- ☒ (a) buy and hold it forever?
- ☒ (b) buy and hold it for two years?
- ☒ (c) buy and hold it for 20 years?

⌘ No.

25

## Using dividends models to estimate the discount rate or the growth rate

Discount Rate can be estimated by:

$$P = \frac{Div_1}{r - g}$$
$$r = \frac{Div_1}{P} + g$$

26

## Valuing Common Stocks

### Example- continued

A stock is selling for \$100 in the stock market. Next year's dividend is \$3. The discount rate for this stock is 12%. what is the market estimate about the growth in dividends?

$$\$100 = \frac{\$3.00}{.12 - g}$$
$$g = .09$$

27

## Some terms about dividend growth rates

⌘ If a firm elects to pay a lower dividend, and reinvest the retained earnings, the stock price may increase because future dividends may be higher.

Payout Ratio : Fraction of earnings paid out as dividends = dividend per share / EPS

Plowback (Retention) Ratio : Fraction of earnings retained by the firm.

Payout ratio = 1 - plowback ratio

28

## Deriving the dividend growth rate $g$

Growth can be derived from applying the return on equity to the percentage of earnings plowed back into operations.

$$ROE = \frac{\text{Return on Equity}}{\text{EPS}}$$
$$= \frac{\text{Book Equity Per Share}}{\text{EPS}}$$

$g = \text{return on equity} \times \text{plowback ratio}$

29

## Example

Our company forecasts to pay a \$5.00 dividend next year, which represents 100% of its earnings. The discount rate is 12%. Instead of paying out all earnings, we decide to plow back 40% of the earnings at the firm's current return on equity of 20%. What is the value of the stock before and after the plowback decision?



30

## Solution

- ⌘ Without growth

$$P = \frac{5}{0.12} = \$41.67$$

- ⌘ With growth

$$g = 0.4 * 0.2 = 0.08$$

$$P = \frac{5 * 0.6}{0.12 - 0.08} = \$75$$

31

## Example (continued)

*The difference between these two numbers (75.00-41.67=33.33) is called the Present Value of Growth Opportunities (PVGO).*

*Present Value of Growth Opportunities (PVGO) :  
Net present value of a firm's future investments.*

32

## The importance of growth opportunity

- ⌘ We often use earnings to value stocks as

$$P = \frac{EPS_1}{r} + PVGO$$

- ⌘ Why do some hi-tech stocks have high prices even though they have little or negative earnings?

33

## II: Corporate value model (Free Cash Flow model)

- ⌘ Also called the **free cash flow method**.

Suggests the value of the entire firm equals the present value of the firm's free cash flows.

- ⌘ A firm generates free cash flows for its stock holders and debt holders, so:
- ⌘ Market value of a firm = Market value of stocks + market value of debt

34

## Applying the corporate value model

- ⌘ Find the market value (MV) of the firm.
  - ☑ Find PV of firm's future FCFs
- ⌘ Subtract MV of firm's debt (and preferred stock, if any) to get MV of common stock.
  - ☑ MV of common stock = MV of firm - MV of debt
- ⌘ Divide MV of common stock by the number of shares outstanding to get intrinsic stock price (value).
  - ☑ P = MV of common stock / # of shares of common stock

35

## Issues regarding the corporate value model

- ⌘ Similar to dividend growth model, often assumes at some point free cash flow will grow at a constant rate.
- ⌘ Terminal value ( $TV_n$ ) represents value of firm at the point of time that growth becomes constant.

36

## Valuing common stocks using FCF (free cash flows)

The value of a business is usually computed as the discounted value of FCF out to a *valuation horizon (H)*.

⌘ The value after *H* is sometimes called the **terminal value** or **horizon value**.

$$PV = \frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \dots + \frac{FCF_H}{(1+r)^H} + \frac{PV_H}{(1+r)^H}$$

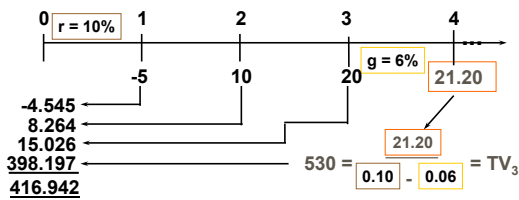
37

## FCF and PV

$$PV = \underbrace{\frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \dots + \frac{FCF_H}{(1+r)^H}}_{PV \text{ (free cash flows)}} + \underbrace{\frac{PV_H}{(1+r)^H}}_{PV \text{ (terminal value)}}$$

38

Given the long-run  $g_{FCF} = 6\%$ , and firm discount rate of 10%, use the corporate value model to find the firm's value.



39

If the firm has \$40 million in debt and has 10 million shares of stock, what is the firm's stock value per share?

$$\begin{aligned} \text{MV of equity} &= \text{MV of firm} - \text{MV of debt} \\ &= \$416.94\text{m} - \$40\text{m} \\ &= \$376.94 \text{ million} \end{aligned}$$

$$\begin{aligned} \text{Value per share} &= \text{MV of equity} / \# \text{ of shares} \\ &= \$376.94\text{m} / 10\text{m} \\ &= \$37.69 \end{aligned}$$

40

## Usually it is more difficult to predict dividend than free cash flows

- ⌘ The corporate value model is often preferred to the dividend growth model, especially when considering firms that don't pay dividends or when dividends are hard to forecast.
- ⌘ Projecting free cash flows might give us more accurate estimates of a firm's value.
- ⌘ A lot of accounting information to predict free cash flow (FCF).

41

## How to get free cash flows (FCF)?

⌘ Remember, free cash flow is the firm's after-tax operating income (NOPAT) less the net capital investment

$$\text{FCF} = \text{NOPAT} - \text{Net capital investment}$$

⌘ NOPAT (net operating profit after tax) =  $\text{EBIT} \times (1 - \text{Tax rate})$

⌘  $\text{FCF} = \text{NOPAT} - \text{Net capital investment}$

⌘ **How to get net capital investment then?**

42

## How to get net capital investment then? (Not required)

- ⌘ net capital investment = *change in operating capital between adjacent years.*
- ⌘ net capital investment in year t = operating capital at the end of year t - operating capital at the end of year t-1.
- ⌘ Operating capital = NOWC + Net Fixed Assets
- ⌘ NOWC = Current assets - Non-interest bearing current liability
- ⌘ Examples of Non-interest bearing current liability: account payable, unearned revenue.
- ⌘ Example of interest bearing current liability: note payable
- ⌘ If we ignore change in working capital, then net capital investment = capital expenditure - depreciation

43

## III: Firm multiples method

- ⌘ Analysts often use the following multiples to value stocks.
  - ⊠ P / E
  - ⊠ P / B
  - ⊠ P / Sales
- ⌘ EXAMPLE: Based on comparable firms, estimate the appropriate P/E. Multiply this by expected earnings per share to figure out an estimate of the stock price.

44

## Example

- ⌘ Firm ABC has EPS=\$2, a similar firm in the same industry has a P/E ratio of 30. What's your estimate of ABC's stock price?
- ⌘  $\$2 * 30 = \$60$
- ⌘ Simple and useful.

45