



FN 201 BUSINESS FINANCE

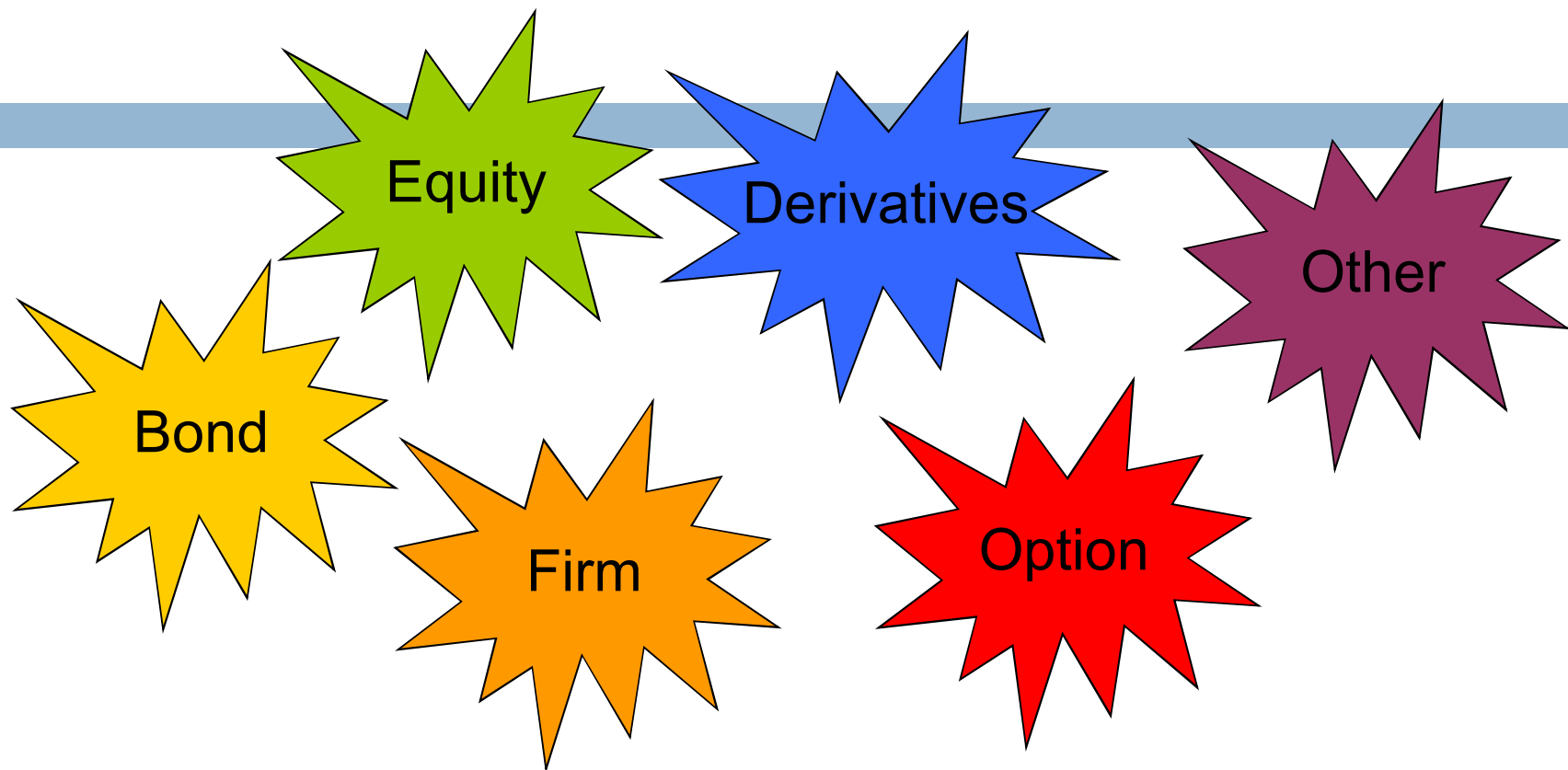


Lecture 7
Equity Valuation



] Agenda

- ▣ Concept
- ▣ Valuation methodologies
 - One period model
 - Generalized dividend valuation model
 - Gordon growth model
 - Price earning valuation model
- ▣ Determine key ingredient



(Any) Financial products are valued as sum of discounted
(expected) cash flow

Concept

- Any financial assets are valued as a sum of discounted (expected) cash flows
 - PV (stock) = PV (expected future dividends)
- Usually return from stock occurs in 2 forms :
 - Dividends & Capital gains (losses)
- Expected return from investing in the stock

$$\text{Expected return} = r = \frac{DIV_1 + P_1 - P_0}{P_0}$$

- DIV_1 = expected dividend per share at the end of the year
- P_1 = expected price at the end of the year

Concept 2

□ Today's Price

- Given investor's forecasts of dividend and price, we can rearrange the equation to obtain today's stock price

$$\text{Price} = P_0 = \frac{DIV_1 + P_1}{1+r}$$

$$\text{Price} = P_0 = \frac{DIV_1 + P_1}{1+r}$$

□ Next Year price.....

- Recursive valuation

$$\text{Price} = P_1 = \frac{DIV_2 + P_2}{1+r}$$

$$\text{Price} = P_2 = \frac{DIV_3 + P_3}{1+r}$$

Concept 3

□ Recursive Valuation

- We obtain

$$P_0 = \sum_{t=1}^H \frac{DIV_t}{(1+r)^t} + \frac{P_H}{(1+r)^H}$$

- As H approaches infinity, the PV of the terminal price will approach zero

$$P_0 = \sum_{t=1}^{\infty} \frac{DIV_t}{(1+r)^t} \quad \text{***}$$



Put your thoughts into it

- What does the formula tell us about equity valuation?
 - ▣ Equity is valued at sum of discounted expected dividend

- Where is the terminal value (P_H)?
 - ▣ As firm approaches infinity, the PV of the terminal price will approach zero

- Do we ignore capital gain?
 - ▣ No, because formula was derived from the assumption that price in any period is determined by expected dividends and capital gains over the next period

Ex 1

- 1.1 Company BE-TU's stock is selling for \$100 per share today. It is expected that this stock will pay a dividend of 6 dollars per share, and then be sold for \$114 per share at the end of one year. Calculate the expected rate of return for the shareholders.
a. 20% b. 15% c. 10% d. 25%

- 1.2 The value of a common stock today depends on:
a. Number of shares outstanding and the number of shareholders
b. The expected future dividends and the discount rate
c. The Wall Street analysts
d. Present value of the future earnings per share

Ex 2

- 2.1 Stockholders expect to receive a year-end dividend of \$5 per share and then be sold for \$115 dollars per share. If the required rate of return for the stock is 20%, what is the current value of the stock?
a. \$100 b. \$122 c. \$132 d. \$110

- 2.2 Company expects to pay a dividend of \$2 per share at the end of year-1, \$3 per share at the end of year -2 and then be sold for \$32 per share. If the required rate on the stock is 15%, what is the current value of the stock?
a. \$28.20
b. \$32.17
c. \$32.00
d. None of the given answers

Ex 3

- 3.1 Company is expected to pay a dividend of \$3 per share at the end of year-1 (D_1) and these dividends are expected to grow at a constant rate of 6% per year forever. If the required rate of return on the stock is 18%, what is current value of the stock today?
a. \$25 b. \$50 c. \$100 d. \$54

- 3.2 Company is expected to pay a dividend of \$2 per share at the end of year -1 (D_1) and the dividends are expected to grow at a constant rate of 4% forever. If the current price of the stock is \$20 per share calculate the expected return or the cost of equity capital for the firm:
a. 10%
b. 4%
c. 14%
d. None of the above

Ex 4

- 4.1 Company has just now paid a dividend of \$2.83 per share (D_0); the dividends are expected to grow at a constant rate of 6% per year forever. If the required rate of return on the stock is 16%, what is the current value on stock, after paying the dividend?
a. \$30 b. \$56 c. \$70 d. \$48

Growth & Income Stocks

- What does growth stock mean?
 - Shares in a company whose earnings are expected to grow at an above-average rate relative to the market.
 - A growth stock usually does not pay a dividend, as the company would prefer to reinvest retained earnings in capital projects.
 - Most technology companies are growth stocks
 - Majority of its returns come from.....

Growth & Income Stocks (2)

- What does income stock mean?
 - ▣ An equity that pays regular, often steadily increasing dividends
 - ▣ Most income stocks have lower levels of volatility than the overall stock market, and offer higher-than-market dividend yields
 - ▣ Have limited future growth options, thereby requiring a lower level of ongoing capital investment.
 - The excess cash flow from profits can therefore be directed back toward investors on a regular basis
 - Most energy, utility companies are income stocks
 - ▣ Majority of its returns come from.....

Valuation methodologies



Stock prices

$$P_0 = \frac{Div_1}{(1 + k_e)} + \frac{P_1}{(1 + k_e)}$$

P_0 = Current stock price

Div_1 = Dividend paid at end of year 1

k_e = Required return on equity investment

P_1 = Stock price at end of year 1: assumed sales price of stock

Should you buy this stock??

Given information:

• $P_0 = \$50$; Expected dividend \$0.16; Predicted $P_1 = 60$

Analysis:

• Assuming required return = 12%

Calculated $P_0 = \$53.71 \rightarrow$ Undervalued stock!!! \rightarrow BUY!!!

Stock prices

$$P_0 = \frac{Div_1}{(1 + k_e)} + \frac{Div_2}{(1 + k_e)^2} + \frac{Div_3}{(1 + k_e)^3} + \dots + \frac{Div_n}{(1 + k_e)^n} + \frac{P_n}{(1 + k_e)^n}$$

$$P_0 = \sum_{t=1}^{\infty} \frac{Div_t}{(1 + k_e)^t} + \frac{P_n}{(1 + k_e)^n}$$

Stock prices

$$P_0 = \frac{D_0 \times (1 + g)^1}{(1 + k_e)} + \frac{D_0 \times (1 + g)^2}{(1 + k_e)^2} + \dots + \frac{D_0 \times (1 + g)^\infty}{(1 + k_e)^\infty}$$

$$P_0 = \frac{D_0 \times (1 + g)}{(k_e - g)} = \frac{D_1}{(k_e - g)}$$

D_0 = Most recent dividend paid

g = expected constant growth rate in dividend

k_e = Required return on equity investment

ASSUMPTIONS:

- Dividends are growing at a constant rate forever
- Growth rate is assumed to be less than the required return on equity

Stock prices

A measure of how much the market is willing to pay for \$1 of earnings from a firm

High P/E ratio means

- **Market expects earnings to rise in the future**
- **Market feels the firm's earnings have very low risk and is willing to pay a premium for them**

$$\frac{P}{E} \times E = P$$

Firm's expected earnings eg. EPS@\$1.13

Industry P/E ratio eg. 23

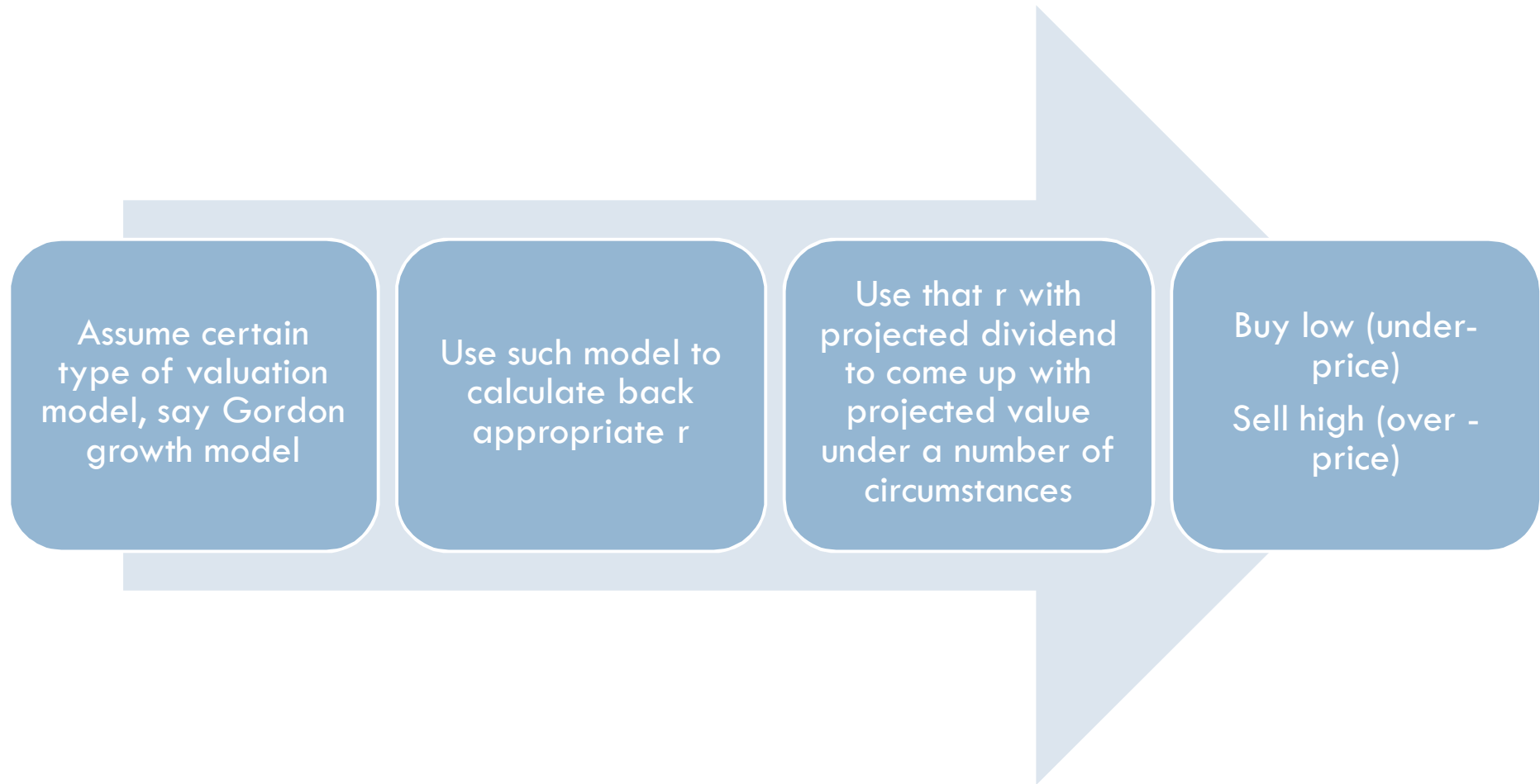


Determine the key ingredient

Estimating the discount rate

- As you can see, valuation of equity depends on significantly on the discount rate (r)
- The next (natural) question is how to obtain r .
- Discount rate r is defined as “the expected return on other securities with the same risk as this stock”
- 2 approaches (1) Obtain from current market price / balance sheet
(2) Use risk and return model

(1) Obtain from current market price



Ex 5 Toyota Homework

$$P_0 = \frac{DIV_1}{r - g}$$

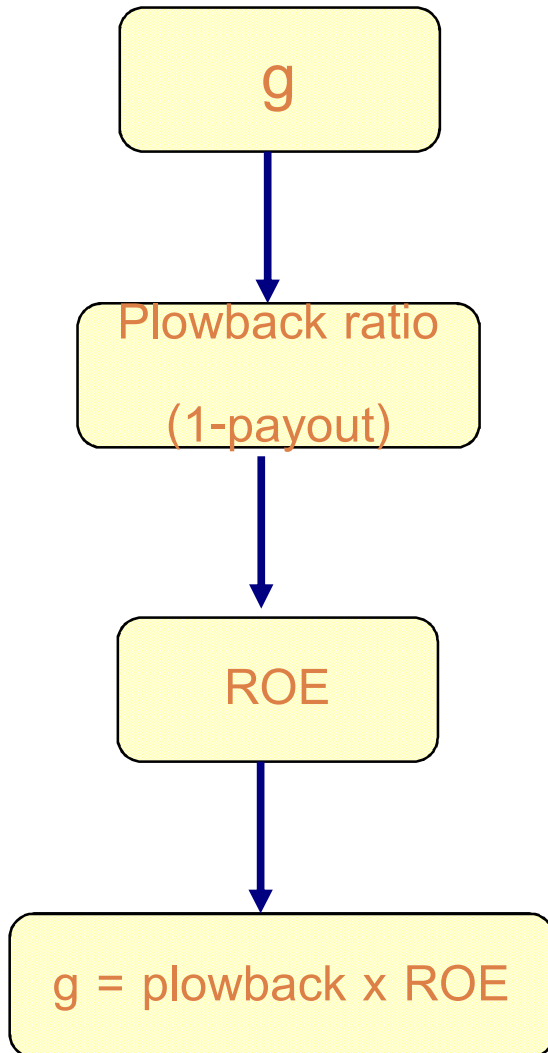
$$r = \frac{DIV_1}{P_0} + g$$

- ▣ Recall Gorgon Growth model
- ▣ To obtain formula for r, rearrange equation gives
 - ▣ DIV_1 / P_0 -> dividend yields -> easy to obtain
 - ▣ g -> expected rate of growth in dividend
- ▣ Toyota Motor Company made a profit of \$1.2 billion for year 2008; a reliable research said the profit is expected to grow 15% per year forever. Given, there are 50 million shares outstanding and the whole annual profit is paid as cash dividend to shareholders at the end of year
 - ▣ Current price at 1 Jan 2010 is 634.8
 - ▣ Estimate r

Ex 5 Toyota Homework (2)

- Unfortunately, on 2nd January 2010, Toyota has to recall its sold cars from customers because of some errors in production. However, it costs \$ 500 million to Toyota in Year 2012 and there is no additional cost for other years. Suddenly, the current stock price drops to \$ 600 per share.
 - As rational investor, should you buy Toyota stock at this price?
 - Why?

Estimating g from Balance Sheet



- ▣ What is the rationale?
- ▣ Plowback ratio
 - ▣ Payout ratio = DIV / EPS
 - ▣ What fraction of earning is payout as dividend and therefore how much was plowing back into or keeping within the business
- ▣ ROE
 - ▣ Return on equity tells how much return is generated per one unit of equity
- ▣ If Plowback = 38%, ROE = 10%
 - ▣ Equity will increase by $.38 \times .1 = .038$ or 3.8%
 - ▣ Earning (and dividend per share) also increase by 3.8%

Ex. 6

- 6.1 The Wall Street Journal quotation for a company has the following values: Div: \$1.12, PE: 18.3, Close: \$37.22. Calculate the dividend pay out ratio for the company (Approximately).
a. 18% b. 55% c. 45% d. None of the above

- 6.2 BETU. pays out 60% of its earnings as dividends. Its return on equity is 15%. What is the stable dividend growth rate for the firm?
a. 9% b. 5% c. 6% d. 15%

Ex 7

- 7.1) Lake Co. has paid a dividend \$3 per share out of earnings of \$5 per share. If the book value per share is \$40, what is the expected growth rate in dividends?
 - a. 7.5%
 - b. 8%
 - c. 12.5%
 - d. 5%

- 7.2) River Co. has paid a dividend \$2 per share out of earnings of \$4 per share. If the book value per share is \$25 and is currently selling for \$40 per share, calculate the required rate of return on the stock.
 - a. 15.2%
 - b. 7.2%
 - c. 14.7%
 - d. 13.4%

Ex 8 Cal. g

- ▣ In US, local gas and electricity utilities company are regulated by state commission
 - In order to keep consumer price down, utilities company are supposed to earn a fair rate of return (r) and charge price accordingly

- ▣ Northwest Natural Gas : $P_0 = \$41.67$ per share at the start of 2007, DIV_1 were expected to be \$1.49
 - Dividend yield = $DIV_1 / P_0 = 1.49 / 41.67 = .036 = 3.6\%$

- ▣ Now to calculate g
 - Payout ratio forecasted to be 62%, so plowback = $1 - .62 = 38\%$
 - ROE was about 10%
 - Dividend growth = $g = \text{plowback} * \text{ROE} = .38 * .1 = .038 = 3.8\%$

- ▣ $r = \text{dividend yield} + g = .036 + .038 = .074$ or 7.4%

What is the danger in this method?

- ▣ Estimation of r for a single common stock is “noisy” and subject to error
- ▣ Slight differences in r and g may lead to significant difference in P_0
- ▣ So what is the good practice?
 - Do not put too much weight on single-company estimates
 - Take samples of similar companies (in the same risk class), estimate r for each and take an average
 - The average gives a more reliable benchmark for financial manager’s decision making because errors may cancel out

What if the g is constant?

- Not a problem!!!

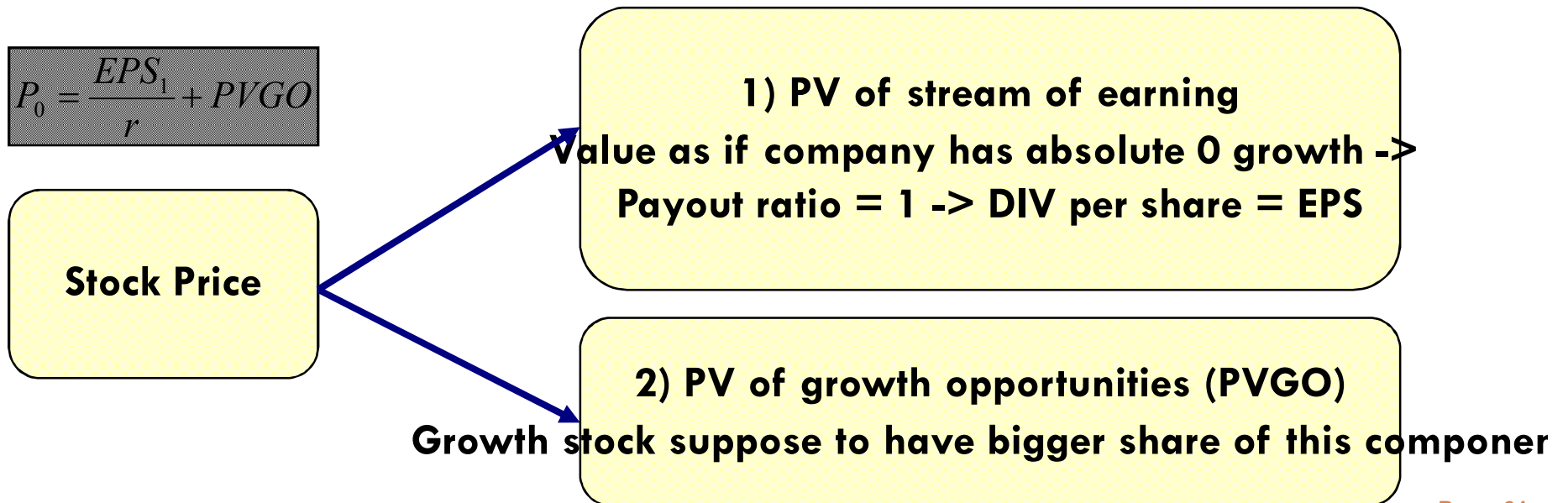
Ex. 9 g is not constant

- 9.1) The In-Tech Co. has just paid a dividend of \$1 per share. The dividends are expected to grow at 25% per year for the next three years and at the rate of 5% per year thereafter. If the required rate of return on the stock is 18%(APR), what is the current value of the stock?
a. \$12.97 b. \$11.93 c. \$15.20 d. None of the above

- 9.2) R&D Technology Corporation has just paid a dividend of \$0.50 per share. The dividends are expected to grow at 24% per year for the next two years and at 8% per year thereafter. If the required rate of return in the stock is 16% (APR), calculate the current value of the stock.
a. \$1.11 b. \$7.71 c. \$8.82 d. None of the above

Can we quantify value of growth prospect of the stock?

- Can we quantify value of growth-component for the growth stock ?
- Yes, there is a way
- 1st step: calculate value of this stock as if there is no future growth
- 2nd step: the difference between value in 1) and market price is the value of potential growth or present value of growth opportunity (PVGO)



Ex 10 US Growth stock

Stock	Stock Price	EPS	Cost of Equity r	PVGO P-EPS/ r	PVGO % of P
Income Stocks					
Cummins (\$)	118.18	12.03	0.157	41.56	35.2%
Dow Chemical (\$)	39.9	4.11	0.125	7.02	17.6%
Unilever (EU)	14.16	0.896	0.091	4.31	30.5%
Growth Stocks					
Microsoft (\$)	29.86	1.57	0.123	17.10	57.3%
Starbucks (\$)	35.42	0.985	0.092	24.71	69.8%
Logica (EU)	1.85	0.111	0.159	1.15	62.3%

- Note that PVGO accounts for well over 50% of value of growth stocks
- Investors expect these companies to invest heavily, grow rapidly and earn returns well above their cost of capital

Ex. 11 PVGO

- 11.1) Summer Co. is expected to pay a dividend of \$4.00 per share out of earnings of \$7.50 per share. If the required rate of return on the stock is 15% and dividends are growing at a current rate of 10% per year, calculate the present value of the growth opportunity for the stock (PVGO).
a. \$80 b. \$30 c. \$50 d. \$26

- 11.2) Parcel Corporation is expected to pay a dividend of \$5 per share next year, and the dividends pay out ratio is 50%. If the dividends are expected to grow at a constant rate of 8% forever and the required rate of return on the stock is 13%, calculate the present value of the growth opportunity.
a. \$100
b. \$76.92
c. \$23.08
d. None of the above

Ex 12. T or F

- 1) The return that is expected by investors from a common stock is also called cost of equity capital.
- 2) All securities in an equivalent risk class are priced to offer the same expected return.
- 3) The only payoff to the owners of common stocks is in the form cash dividends.
- 4) It is not possible to value a firm with supernormal (variable) growth rate for the first few years of its life.
- 5) A large percentage of the total value of a growth stock comes from the growth opportunity
- 6) The discounted-cash-flow formulas that is used to value common stocks can also be used to value entire businesses


(2) Use risk and return model



Firm Valuation

- ▣ Do the Discounted-Cash-Flow (DCF) formulas still work for entire well as shares of common stocks?
 - It surely does!!!
- ▣ The differences are
 - Stock -> Focus on Dividends
 - Firm -> Free Cash Flow (FCF)
- ▣ Free Cash Flow is the amount of cash that firm can (not will) pay out to investors after paying for necessary investment
 - Typically a two-stage DCF model is used. Free cash flows are forecasted out to a horizon and discounted to present value.
 - Then a horizon value is forecasted, discounted and added to the present value of free cash flows. The sum is the value of the business.
- ▣ This may look easy in theory but is quite complicated in practice.





Q&A