

STOCK VALUATION

Created by David Moore, PhD

Reference Material: Chapter 8 of Textbook

TOPICS

1. Stock Valuation
 - Intrinsic: Dividend Growth Model
 - Relative: Using Multiples
2. Features of Common and Preferred stock
3. Stock Markets

STOCK VALUATION: DEVELOPING THE MODEL

CASH FLOW TO STOCKHOLDERS

As with bonds, the price of the stock is the present value of these expected cash flows

- If you own a share of stock, you can receive cash in two ways
 - The company pays dividends
 - You sell your shares, either to another investor in the market or back to the company

ONE PERIOD EXAMPLE

Suppose you are thinking of purchasing the stock of Richie Medical Devices, 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 PRICE

$$D_1 = 2$$

$$R = 20\%$$

$$P_1 = 14$$

$$CF_1 = 16$$

Compute present value of expected cash flows:

$$P_0 = \frac{2+14}{1.20} = \frac{16}{1.20} = 13.33$$

TWO PERIOD PRICE

What if you decide to hold the stock for two years? Assume the price and dividend grows at 5%.

$$D_1 = 2 \quad D_2 = 2.10$$

$$P_2 = 14.70$$

$$CF_1 = 2 \quad CF_2 = 16.80$$

Compute present value of expected cash flows:

$$P_0 = \frac{2}{1.20} + \frac{2.10+14.70}{1.20^2} = 13.33$$

THREE PERIOD PRICE

What if you decide to hold the stock for three years?

$$D_1 = 2 \quad D_2 = 2.10 \quad D_3 = 2.205$$

$$P_3 = 15.435$$

$$CF_1 = 2 \quad CF_2 = 2.10 \quad CF_3 = 17.640$$

Compute present value of expected cash flows:

$$P_0 = \frac{2}{1.20} + \frac{2.10}{1.20^2} + \frac{2.205+15.435}{1.20^3} = 13.33$$

DEVELOPING THE MODEL

- You could continue to push back when you would sell the stock
- You would find that the price of the stock is really just the present value of all expected future dividends

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

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

VALUATION: ESTIMATING DIVIDENDS

THREE SPECIAL CASES

1. Zero Growth
 - Firm will pay a constant dividend forever
 - Price is computed using the perpetuity formula
2. Constant Dividend Growth
 - Firm will increase the dividend by a constant percent every period
 - Price is computed using the growing perpetuity formula
3. Non-Constant Growth
 - Dividend growth is not consistent initially, but settles down to constant growth eventually
 - Use a combination of TVM techniques

ZERO GROWTH

Dividends expected at regular intervals forever = perpetuity

$$P_0 = D/r$$

Suppose stock is expected to pay a \$0.50 dividend every year and the required return is 10%. What is the price?
Price = 5

CONSTANT GROWTH STOCK

One whose dividends are expected to grow forever at a constant rate, g .

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

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

$$D_3 = D_0(1 + g)^3$$

D_0 = Dividend just paid $D_1 - D_t$ = Expected dividends

CONSTANT GROWTH FORMULA

$$\hat{P}_0 = D_0 \sum_{t=1}^{\infty} \frac{(1+g)^t}{(1+r)^t} = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

CONSTANT GROWTH: EXAMPLE

Suppose Champy's Chicken, Inc. just paid a dividend of \$0.50. It is expected to increase its dividend by 2% per year. If the market requires a return of 15% on assets of this risk, how much should the stock be selling for?

$$D_0 = 0.50$$

$$g = 2$$

$$r = 15$$

$$\text{Price} = 3.92$$

NON-CONSTANT GROWTH

One whose dividends are expected to grow at a "supernormal" growth for a fixed time and then grow forever at a constant rate.

Suppose a firm is expected to increase dividends by 20% in one year and by 15% in two years. After that dividends will increase at a rate of 5% per year indefinitely. If the last dividend was \$1 and the required return is 20%, what is the price of the stock?

NON-CONSTANT GROWTH: SOLUTION

1. Compute the dividends until the growth rate levels off.
2. Find the expected future price at the beginning of the constant growth period
3. Find the present value of the expected future cash flows
Price = 8.67

DIVIDEND GROWTH MODEL

DIVIDEND GROWTH MODEL

$$\hat{P}_t = \frac{D_{t+1}}{r-g}$$

BREAKING DOWN DGM

Gordon Growth Company is expected to pay a dividend of \$4 next period and dividends are expected to grow at 6% per year. The required return is 16%.

- What is the current price?
- What is the price expected to be in year 4?
- What is the implied return given the change in price during the four year period? Notice anything?

REARRANGING DGM

The value of the stock depends on the expected dividend level, the discount rate (R), and the growth rate (g).

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

- Required (total) return on a stock has two parts: dividend yield and capital gains yield.
- $\frac{D_1}{P_0}$ is the dividend yield
- Capital gains yield = expected growth rate of the stock price, which matches the dividend growth rate.

CONSTANT GROWTH MODEL CONDITIONS

1. Dividend expected to grow at g forever
2. Stock price expected to grow at g forever
3. Expected dividend yield is constant
4. Expected capital gains yield is constant and equal to g
5. Expected total return, r , must be $> g$
6. Expected total return (r): = expected dividend yield(DY) + expected growth rate (g)

GROWTH AND PAYOUT

- Two conditions must exist if a company is to grow:
 - It must invest and not pay out all of its earnings as dividends all the time, and
 - It must earn a return on invested capital
- Why don't firms with no dividends have stock price of \$0?
 - Such firms believe their earnings are better used to pursue growth opportunities; High growth firms tend to have zero or low payout.
 - Investors of a zero-dividend firm pay the stock price based on the expected growth rate.
 - Expectation is firm will eventually pay a dividend, just not currently paying a dividend

STOCK VALUATION USING MULTIPLES

USING MULTIPLES: EARNINGS

- The price-earnings (PE) ratio: the current stock price divided by annual EPS:
 - $P/E \text{ Ratio} = \frac{\text{Price Per Share}}{EPS}$
- In practice, PE ratios are calculated using forecasted EPS or trailing (i.e., past) EPS.
 - Using forecasted EPS would lead to forward PE
- In addition to DGM, a common valuation approach is to multiply a benchmark PE ratio by earnings per share (EPS) to come up with a stock price:
 - $P_t = \text{Benchmark P/E Ratio} * EPS_t$

USING MULTIPLES: SALES

- Similarly, one can use sales multiples for stock valuation:

$$EV_t = \text{Enterprise Value} / \text{Sales Ratio} * \text{Sales}_t$$

Equity Value = Enterprise Value - Net Debt; where Net Debt = Debt - Cash

USING MULTIPLES: EXAMPLE

Suppose Sloth's are Cool Co. had earnings per share of \$3 over the past year. The industry average PE ratio is 12. What is the estimated price per share (today)?

$$Price = 3 \times 12 = 36$$

Could you use the following information to estimate the stock price. The comparables median EV/Sales ratio is 1.7. Sales are \$350 million and the company has 15 million shares outstanding. Net Debt is \$25 million

$$Price = \frac{(1.7 * 350) - 25}{15} = 38.00$$

FEATURES OF COMMON AND PREFERRED STOCK

COMMON STOCK

Equity without priority for dividends or bankruptcy

Common Stock Features:

- Voting rights: generally "one share = one vote"
- Two types of Voting: 1) Straight 2) Cumulative
- Elections are typically staggered
- Proxy voting: grant of authority by a shareholder allowing another individual to vote his or her shares
- Proxy fight: When an "outside" group of shareholders attempt to remove directors/management.

- Some firms have multiple classes of stock.
- Typically different share classes have different voting rights
- Example: Berkshire Hathaway Class A and B

Berkshire Hathaway Inc. has two classes of common stock designated Class A and Class B. *A share of Class B common stock has the rights of 1/1,500th of a share of Class A common stock except that a Class B share has 1/10,000th of the voting rights of a Class A share (rather than 1/1,500th of the vote).* Each share of a Class A common stock is convertible at any time, at the holder's option, into 1,500 shares of Class B common stock. This conversion privilege does not extend in the opposite direction. That is, holders of Class B shares are not able to convert them into Class A shares. Both Class A & B shareholders are entitled to attend the Berkshire Hathaway Annual Meeting which is held the first Saturday in May.

COMMON STOCK: OTHER FEATURES

- Share proportionally in declared dividends
- Share proportionally in remaining assets during liquidation
- Right to vote on matters of great importance i.e. merger
- Preemptive right (in some cases): Right of first refusal to buy new stock issue to maintain proportional ownership if desired

PREFERRED STOCK

Stock with dividend priority over common stock

- Dividends:
 - Must be paid before dividends can be paid to common stockholders
 - Not a liability of the firm
 - Can be deferred indefinitely
 - Most preferred dividends are cumulative
 - Missed preferred dividends have to be paid before common dividends can be paid
- Preferred stock generally does not carry voting rights
- Debt in disguise

THE STOCK MARKET

MARKETS

1. Primary: market in which new securities are originally sold to investors. (IPO market)
2. Secondary: market in which previously issued securities are traded among investors

DEALER VS AUCTION (BROKER)

- Dealer: maintains an inventory and stands ready to buy and sell at any time.
 - Over-the-counter(OTC) markets, ex. NASDAQ or used car dealership
- Auction (Broker): connects buyers to sellers in a physical location. ex. NYSE or real estate broker

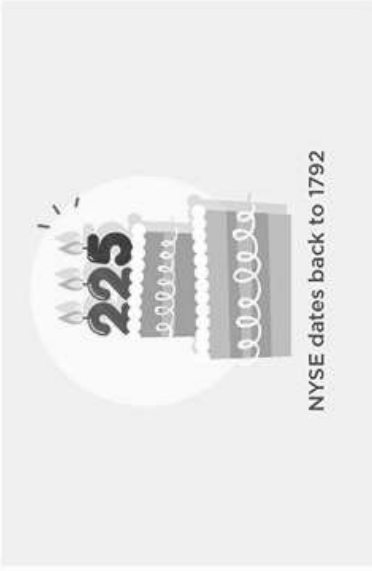
DEALER MARKETS

- Recall bid, ask, and bid-ask spread.
 - Analogous to willing to pay, willing to sell, and profit.
- Your bookstore operates like a dealer market (primary and secondary)

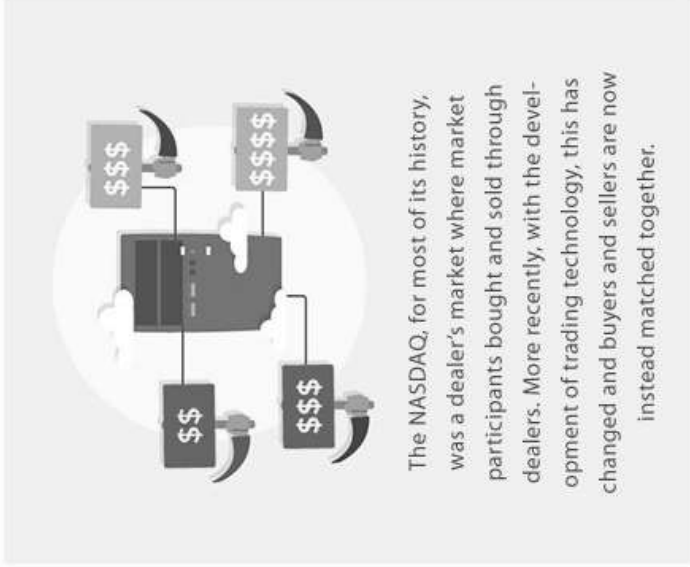
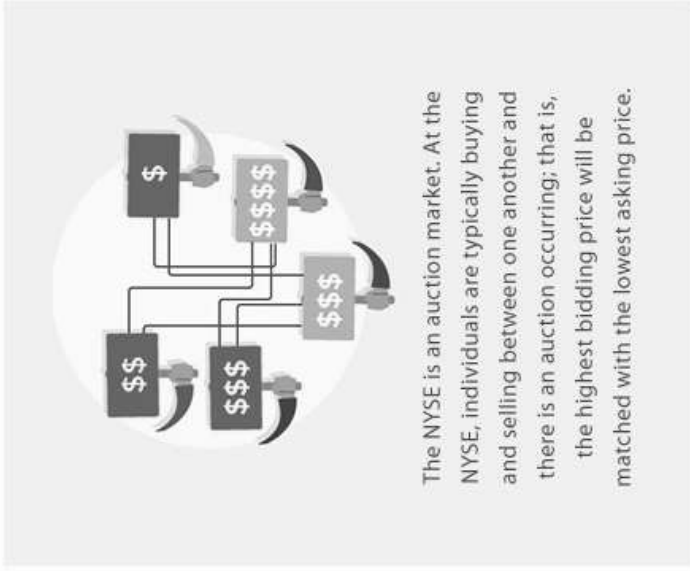
BROKER MARKETS

- Arranges transactions; does not buy or sell for their own account.
- Amazon used textbook operates as auction broker market.

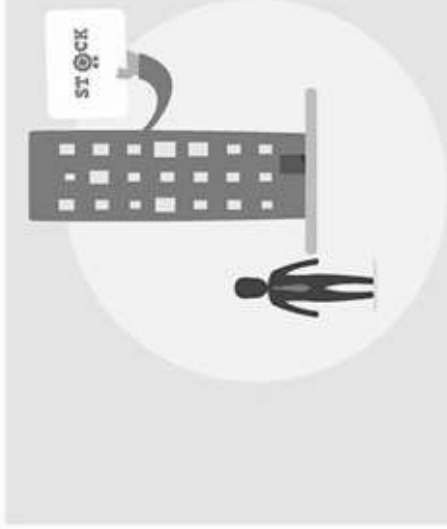
FOUNDED



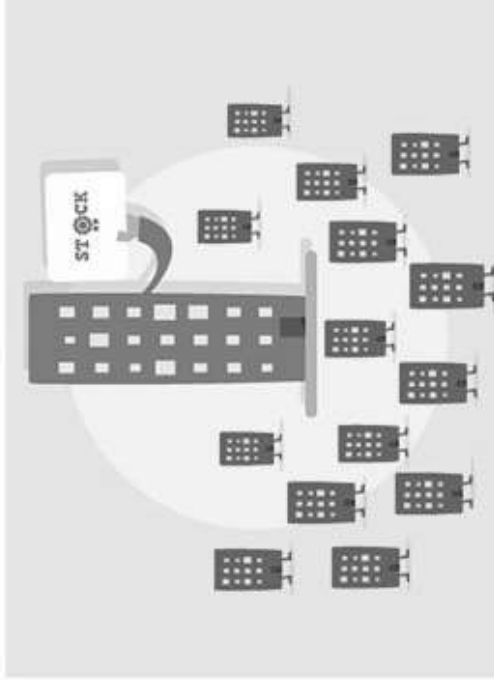
MARKET TYPE



TRAFFIC CONTROL

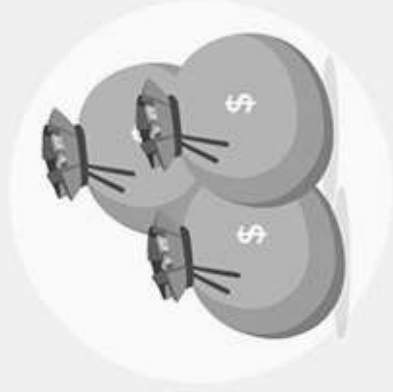


Each security usually has a Designated Market Maker (DMM) to provide liquidity and efficient trading, and the exchange also has Supplementary Liquidity Providers (SLPs) as well.



Each security on the NASDAQ generally has more than one market maker ready to provide liquidity and efficient trading. Apple, the world's biggest company, has 54 registered Market Makers.

LISTING FEE



The initial listing fee is \$50,000, and the annual fee is \$59,500. Meanwhile, Listing fees are capped at \$500,000.

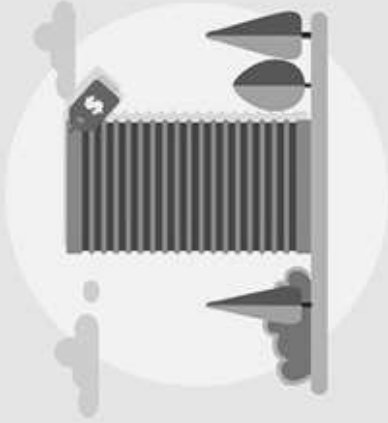


The initial listing fee is \$50,000 to \$75,000. The annual fee ranges between \$42,000 and \$155,000 depending on size of company.

MARKET CAPITALIZATION



The market capitalization of the 2,400-some companies listed on the NYSE today exceeds \$26 trillion.



The NASDAQ is home to 3,800 listings with a market capitalization of \$11 trillion.

PERCEPTION



Companies on NYSE are perceived to be less volatile.



NYSE has blue chip firms and industrials that are since our grandparents, and its stocks are considered to be more stable and established. E.g. : Exxon Mobil Corp., Berkshire Hathaway.



The stocks on the NASDAQ are considered to be more volatile and growth oriented.

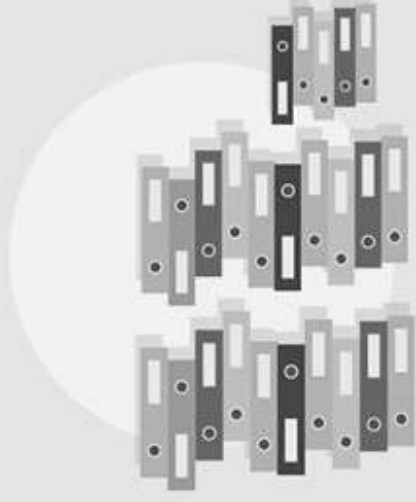


The Nasdaq is typically known as a high-tech market, attracting many of the firms dealing with the internet or electronics. E.g. : Apple, Microsoft, Facebook, Amazon. Google.

IPO



The New York Stock Exchange saw 34 IPOs in 2016, which raised US\$13.6b, accounting for 10% of IPO proceeds worldwide, but only 3% of the total global IPOs.



In the same year, the NASDAQ was the world's sixth most active exchange, by both deal numbers and proceeds. There were 77 deals raising US\$7.4b, accounting for 7% of global IPOs and 6% of proceeds.

NYSE

- Largest stock market in the world
- Located on Wall Street; auction market
- Most buys and sells are matched electronically nowadays
- Members:
 - Designated Market Maker
 - Floor Broker
 - Supplemental Liquidity Providers
- Order Flow: Flow of customer orders to buy and sell securities

Recent IPOs: Doordash, Uber, Chewy

NASDAQ

- Not a physical exchange – computer-based quotation system
- Market makers act similarly to NYSE DMMs (except there exist multiple market makers for stocks)
- Dealer market
- Large portion of technology stocks
 - Recent IPOs: Airbnb, Peleton, Smile Direct

MORE PRACTICE

EXAMPLE 1

Suppose Pirates, Inc. is expected to pay a \$2 dividend in one year. If the dividend is expected to grow at 5% per year and the required return is 20%, what is the price? What is the price if the dividend was just \$2 with no expectation of growth?

Answer: $P_0 = 13.33$; $P_0 = 10.00$

EXAMPLE 2

XYZ stock currently sells for \$50 per share. The next expected annual dividend is \$2, and the growth rate is 6%.

What is the expected rate of return on this stock?

If the required rate of return on this stock were 12%, what would the stock price be, and what would the dividend yield be?

Answer: $r=10\%$; $P_0 = 33.33$; Yield=6%

EXAMPLE 3

AcheE Corp.'s last dividend was \$.65 per share. Its dividends are expected to grow at a rate of 4% and the current price per share is \$11.25. What is the discount rate (i.e., cost of capital, required return) implicit in its price?

Answer: $r=10.01\%$

KEY LEARNING OUTCOMES

- Stock Valuation
 - Intrinsic: Dividend growth model
 - Zero growth
 - Constant Growth
 - Non-Constant Growth
 - Relative: Trading Multiples
- Common and Preferred Stock features
- Stock Market
 - Broker or Auction (NYSE) vs Dealer (NASDAQ)