

FINA 1303

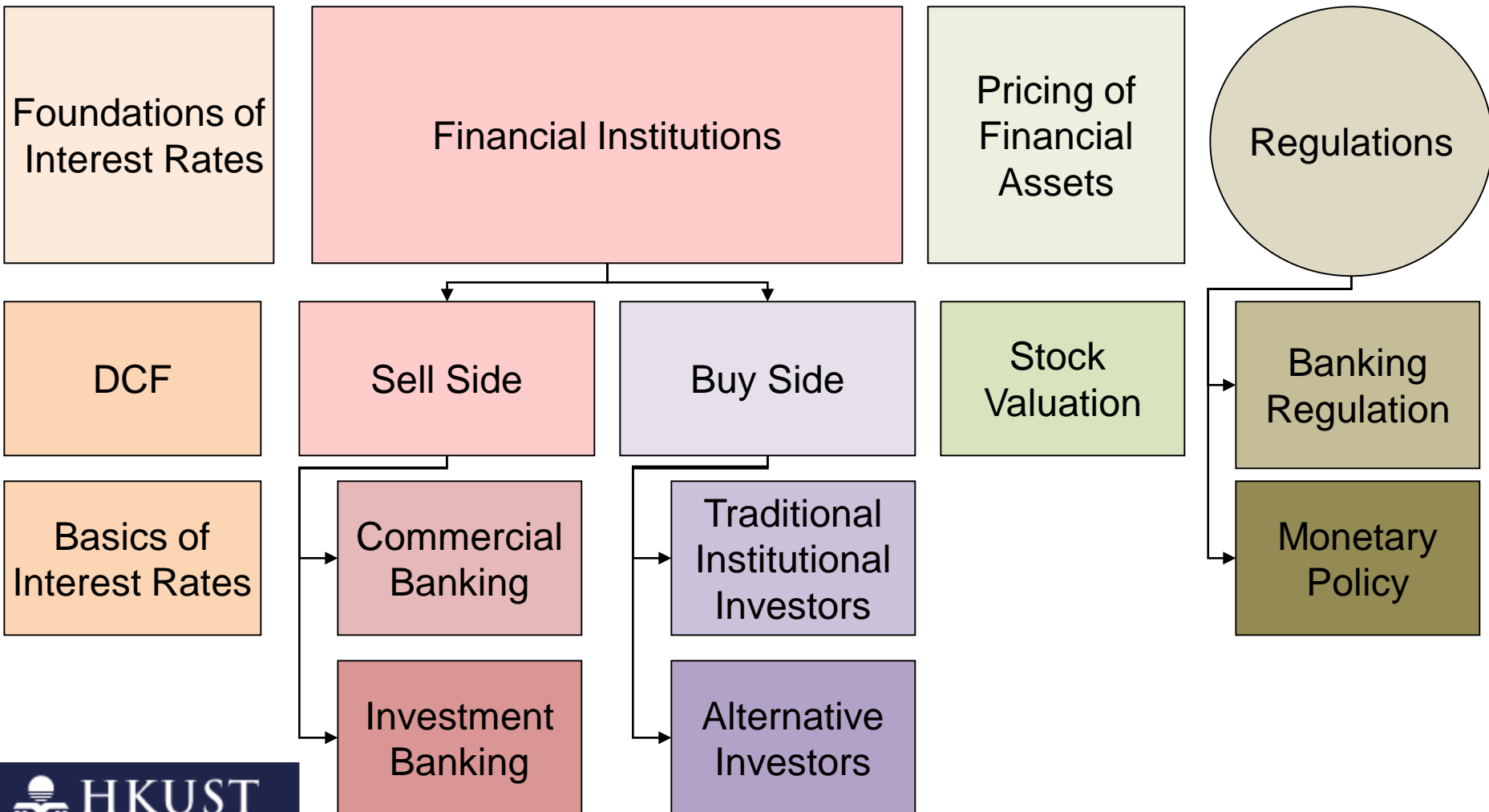
PRICING OF FINANCIAL ASSETS

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Course Map

Overview



Course Map

Overview

Pricing of
Financial
Assets

Stock
Valuation

Students will develop an understanding of:

1. What are Shares
2. Basics of Stocks
3. The Dividend Discount Model “DDM”

What Are Shares

- Shares (or stocks) represent a piece of ownership in a corporation
- Shareholders rights:
 - Voting at shareholders meetings,
 - Dividends (if any),
 - Pro-rata of net assets in liquidation, i.e. residual claim once all debt has been paid,
- There are sometimes different classes of shares: Common Shares and Preferred Shares...as well as Founders Shares
 - Different rights in respect of voting, dividends, claim on net assets.

Stock Price Quote for Cathay Pacific

<http://www.google.com/finance?cid=671410>

- Ticker: 0293
- D = dividend payment
- EPS = earnings per share
- P/E = price to earnings ratio
- Mkt cap= market capitalization



Shareholders Votes and Shareholders Meetings

- **Annual Meeting:** once a year shareholders vote on directors and other proposals as well as ask managers questions. All shareholders have the right to attend the annual meeting and cast their shares directly (in accordance with their voting rights).
 - **Proxy:** a written authorization for someone else to vote your shares
 - **Proxy Contest:** when two or more groups are competing to collect proxies to prevail in a matter up to shareholders vote (such as the election of directors)
- There are two main types of voting
 - **Straight Voting:** shareholders vote for each director separately, with each shareholder having as many votes as shares held
 - **Cumulative Voting:** each shareholder is allocated votes equal to the number of open spots multiplied by his/her number of shares (shareholder can allocate his vote to all or only some of the directors)

Application: The Snap IPO

- http://www.reuters.com/article/us-snap-ipo-idUSKBN1683BP?utm_source=Twitter&utm_medium=Social
- <https://finance.yahoo.com/quote/SNAP/>
- Key facts:
- Snapchat's parent **Snap** listed on the NYSE at a price of **\$17** per share raising \$2.6Bn and valuing the company at ~\$24Bn
- The price “popped” up to \$24.48 a share at the close of the opening day, going up as much as **\$27**
- The company made **no profits** and **didn't expect to** in the near future; it had **negative free cash flow** of \$677 million
- The shares sold to the public have **no voting rights at all**; Snap is the only company listed in NYSE with no voting rights

Preferred v. Common Shares

- Preferred Stock: stock with preference over common shares in payment of dividends and in liquidation
 - Cumulative versus Non-Cumulative Preferred Stock:
 - cumulative = preferred stock where all the missed dividends must be paid before any common dividends can be paid;
 - non-cumulative = preferred stock where the missed dividends do not accumulate. Only the current dividend is owed before common dividends can be paid
 - Preferred Stock: Equity or Debt?
 - Generally no voting rights
 - Priority over common shareholders for payments of dividends and in liquidation
 - Behind bondholders & creditors in liquidation
 - Dividends paid after tax (US)

The Mechanics of Stock Trades

Video: How NYSE works:
<https://www.youtube.com/watch?v=XRJBZIQrQAY>
NYSE floor trading:
https://www.youtube.com/watch?v=G_IK0Q1FCnk

- Market Order = order at market (no specified price)
- Limit Order = order at specific price
- Round Lot = 100 shares
- Most exchanges today are **fully electronic**; NYSE is one of the very few that still has **floor trading**: **specialists** hold trading licenses and make markets in some securities: **floor brokers** represent customers orders on the floor

Remember each exchange has its own rules! Before you start trading, check out the rules of the exchange!

How trades work



Equity Valuation: the Dividend-Discout Model “DDM”

- How do we value listed shares or stocks?
- We will apply what we learned from DCF to cash flows arising from shares/stocks

DDM

- With a **1 year time horizon**, an investor buys a listed stock today (time=0) at market price P_0 , gets a dividend Div_1 after 1 year and sells the stock at then market price P_1 ,
- So the cash flows consist of Div_1 the dividend and P_1 the sale price of the stock
- Discounting the cash flows with the expected return r_E leads to:



$$P_0 = \frac{Div_1 + P_1}{1 + r_E}$$

- Notice that the price of the stock P_0 is the PV of the expected cash flows from the stock (we are simply applying what we learned in DCF !)

DDM

■ Dividend Yields, Capital Gains, and Total Returns

- **Dividend Yield:** expected annual dividend of a stock divided by its current price = % return an investor expects to earn from the dividend paid by the stock
- **Capital Gain:** the amount by which the selling price of the stock exceeds the purchase price
 - Capital Gains Rate: capital gain as % of initial price of the stock
- **Total Return:** stock's dividend yield plus capital gain rate

$$\begin{array}{c} \textbf{Total Return} \\ r_E = \frac{Div_1 + P_1}{P_0} - 1 = \underbrace{\frac{Div_1}{P_0}}_{\text{Dividend Yield}} + \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital Gain Rate}} \end{array}$$

DDM

- So when buying that stock at P_0 , the expected return r_E can be broken down as:

$$r_E = \frac{\text{Div}_1 + P_1}{P_0} - 1 = \frac{\text{Div}_1}{P_0} + \frac{P_1 - P_0}{P_0}$$

$$r_E = \text{Dividend Yield} + \text{Capital Gain Return} = \text{Total Return}$$

- If **expected Dividend Yield + expected Capital Gain Return \geq expected return (hurdle rate) of the investor**, then the investor should buy that stock.

Example: Stock Prices and Returns

- Suppose you expect Funky Gold Company (FGC) to pay an annual **dividend** of **\$0.56** per share in the coming year and to trade at **\$45.50** per share **at the end of the year**.
- If investments with equivalent risk to FGC' stock have an expected return of **6.80%**, **what is the most you would pay today for FGC's stock?**
- **What dividend yield and capital gain rate would you expect at this price?**

Example : Stock Prices and Returns

Solution:

- We solve for the beginning price we would pay now (P_0) given our expectations about dividends ($Div_1 = \$0.56$) and future price ($P_1 = \45.50) and the return we expect to earn to be willing to invest ($r_E = 0.068$).

$$P_0 = \frac{Div_1 + P_1}{1 + r_E}$$

- We can calculate the dividend yield and capital gain rate

Example : Stock Prices and Returns

Execute:

$$P_0 = \frac{Div_1 + P_1}{1 + r_E} = \frac{\$0.56 + \$45.50}{1.0680} = \$43.13$$

- We see that at this price, FGCs' **dividend yield** is $Div_1/P_0 = 0.56/43.13 = 1.30\%$.
- The **expected capital gain** is $\$45.50 - \$43.13 = \$2.37$ per share, for a capital gain rate of $2.37/43.13 = 5.50\%$.

Example : Stock Prices and Returns

Evaluate:

- At a price of \$43.13, FGCs' expected total return is $1.30\% + 5.50\% = \mathbf{6.80\%}$, which is equal to its equity cost of capital (the return being paid by investments with equivalent risk to FGCs').
- This amount of \$43.13 is the most we would be willing to pay for FGCs' stock.
- If we paid more, our expected return would be less than 6.8% and we would rather invest elsewhere.

Your Turn!

- Problem:
- Suppose you expect Koch Industries to pay an annual **dividend** of **\$2.31** per share in the coming year and to trade at **\$82.75** per share **at the end of the year**.
- If investments with equivalent risk to Koch's stock have an expected return of **8.9%**, what is **the most you would pay today for Koch's stock?**
- What **dividend yield and capital gain rate** would you expect at this price?

Test Your Understanding

■ The stock price we are willing to pay is:

- 69.5
- 78.11
- 85.9

■ The dividend yield is:

- 2.96%
- 5.94%
- 8.90%

■ The capital gain rate is:

- 2.96%
- 5.94%
- 8.90%



Solution

- We can solve for the beginning price we would pay now (P_0) given our expectations about dividends ($Div_1=2.31$) the future price ($P_1=\$82.75$) and the return ($r_E=8.9\%$) we expect to earn to be willing to invest.

$$P_0 = \frac{Div_1 + P_1}{1 + r_E}$$

- We can calculate the dividend yield and capital gain.

Total Return

$$r_E = \frac{Div_1 + P_1}{P_0} - 1 = \underbrace{\frac{Div_1}{P_0}}_{\text{Dividend Yield}} + \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital Gain Rate}}$$

Solution

- Execute:

$$P_0 = \frac{Div_1 + P_1}{1 + r_E} = \frac{\$2.31 + \$82.75}{1.089} = \$78.11$$

- At this price, Koch's dividend yield is $Div_1/P_0 = 2.31/78.11 = 2.96\%$.
- The expected capital gain is $\$82.75 - \$78.11 = \$4.64$ per share, for a capital gain rate of $4.64/78.11 = 5.94\%$.
- At a price of \$78.11, Koch's expected total return is $2.96\% + 5.94\% = 8.90\%$, which is equal to its equity cost of capital (the return being paid by investments with equivalent risk to Koch's).
- This amount is the most we would be willing to pay for Koch's stock. If we paid more, our expected return would be less than 8.9% and we would rather invest elsewhere.

Test Your Understanding

- Expected share price (P_1): \$50
- Expected dividend (Div_1): \$0.50
- Expected rate of return (r_E): 5%
- Calculate P_0
- The correct answer is:
 - 49.5
 - 48.10
 - 55



Test Your Understanding (ctd)

- Calculate the dividend yield : Div_1 / P_0
- Possible answers:
 - 1.05%
 - 1.04%
 - 1.03%
- Calculate capital gain $P_1 - P_0$
- Possible answers
 - 1.8
 - 1.9
 - 2.1



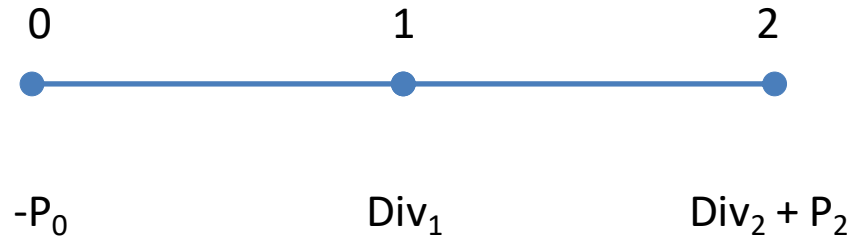
Test Your Understanding (ctd)



- What is the capital gain return (capital gain/ P_0)?
- Possible answers:
 - 3.81
 - 3.96
 - 4.10
- From the answers above, calculate the total return/expected return (dividend yield + capital gain rate)
- Possible answers:
 - 4.5%
 - 5%
 - 5.5%

DDM

- With **2 years** time horizon, an investor buys the stock today at P_0 , gets dividends Div_1 & Div_2 in years 1 & 2, and then sells the stock at P_2 in year 2,



- Discounting the cash flows with the expected return r_E leads

to:

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2 + P_2}{(1 + r_E)^2}$$

- not different from applying the 1 year calculation twice

DDM

- Buying a stock at P_0 and selling at P_n in year n , collecting dividends in between, the DCF formula applies:

$$P_0 = \frac{\text{Div}_1}{(1 + r_E)^1} + \frac{\text{Div}_2}{(1 + r_E)^2} + \dots + \frac{\text{Div}_n}{(1 + r_E)^n} + \frac{P_n}{(1 + r_E)^n}$$

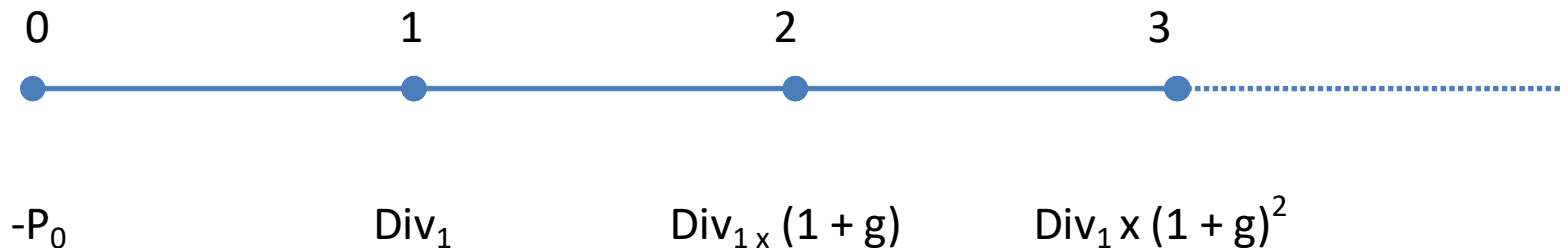
- Considering that investors buying the stock at P_n in year n follow the same logic, we can push it to **infinity** leading to a valuation of:

$$P_0 = \frac{\text{Div}_1}{(1 + r_E)^1} + \frac{\text{Div}_2}{(1 + r_E)^2} + \dots + \frac{\text{Div}_n}{(1 + r_E)^n} + \dots$$

- The stock price is the **Present Value of all the expected future dividends**

DDM – Constant Dividend Growth

- When the dividend growth g is constant, the DCF calculation is simpler:



$$P_0 = \frac{\text{Div}_1}{(1 + r_E)^1} + \frac{\text{Div}_1 \times (1 + g)}{(1 + r_E)^2} + \dots + \frac{\text{Div}_1 \times (1 + g)^{n-1}}{(1 + r_E)^n} + \dots$$

- Simplified calculations lead to the **Constant Dividend Growth Model** (when $r_E > g$): *(notice this is exactly what we learned before for perpetuals!)*

$$P_0 = \frac{\text{Div}_1}{r_E - g}$$

Example : Valuing a Firm with Constant Dividend Growth

- Suppose Great China Inc (GCI) plans to pay **\$2.30** per share in **dividends** in the coming year.
- If the expected rate of return is **7%** and dividends are expected **to grow** by **2%** per year in the future, **estimate the value of GCI's stock today**.

Example : Valuing a Firm with Constant Dividend Growth

Solution:

- Because the dividends are expected **to grow perpetually at a constant rate**, we can calculate the price P_0 of GCI.
- The next dividend (Div_1) is expected to be \$2.30, the growth rate (g) is 2% and the expected return (r_E) is 7%.

Example : Valuing a Firm with Constant Dividend Growth

Execute:

$$P_0 = \frac{Div_1}{r_E - g} = \frac{\$2.30}{0.07 - 0.02} = \$46.00$$

You would be willing to pay \$46, that is to say 20 times this year's dividend of \$2.30, to own GCI stock today because you are buying claim to this year's dividend and to an infinite growing series of future dividends.

Your Turn!

- Problem:
- Suppose Target Corporation plans to pay **\$0.68** per share in **dividends** in the coming year.
- If its equity cost of capital is **10%** and dividends are expected to grow by **8.4%** per year in the future, estimate **the value of Target's stock**.

Test Your Understanding

■ Target's stock price (P_0) is:

- 42.50
- 53.45
- 68.59



Solution

- Because the dividends are expected to grow perpetually at a constant rate, we can value Target.
- The next dividend (Div_1) is expected to be \$0.68, the growth rate (g) is 8.4% and the equity cost of capital (r_E) is 10%.

$$P_0 = \frac{Div_1}{r_E - g}$$

Solution

Execute:

$$P_0 = \frac{Div_1}{r_E - g} = \frac{\$0.68}{.10 - .084} = \$42.50$$

Evaluate:

- You would be willing to pay 62.5 times this year's dividend of \$0.68 to own Target stock because you are buying claim to this year's dividend and to an infinite growing series of future dividends.

Test Your Understanding

Problem:

- Suppose Gold Trading Company (GTC) plans to pay **\$0.50** (Div_1) per share in dividends in the coming year.
- If the expected rate of return (r_E) is **8%** and dividends are expected to grow (g) by **4%** per year in the future, estimate the value (P_0) of GTC's stock today.

Test Your Understanding

- Calculate P_0
- Possible answers:
 - 11.60
 - 12.50
 - 13.45



Limitations of the Dividend-Discount Model

- Value Drivers and the Dividend-Discount Model
 - The dividend-discount model includes an **implicit forecast** of the firm's **profitability** which is discounted back at the firm's equity cost of capital
- Uncertain Dividend Forecasts
 - The dividend-discount model values a stock based on a **forecast** of the future dividends, but a firm's future dividends carry a tremendous amount of **uncertainty**
- **Remember to question the assumptions you make when doing your forecasts.**
- Practitioners will typically run **sensitivity analysis** on key assumptions

DDM – What To Keep In Mind

- Constant Dividend Growth Model formula applies **only** when $r_E > g$,

- The expected return from a stock investment over 1 year is

$$r_E = \frac{\text{Div}_1}{P_0} + g$$

- for listed companies there is a trade-off between increasing dividends and growth rate, assuming unchanged earnings, it depends on
 - a) dividend payout rate and
 - b) number of shares outstanding (share repurchases)
- For stocks with uncertain dividend or paying no dividend, DDM is of limited help.

In summary: the Dividend-Discount Model

General formula

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \frac{P_N}{(1 + r_E)^N}$$

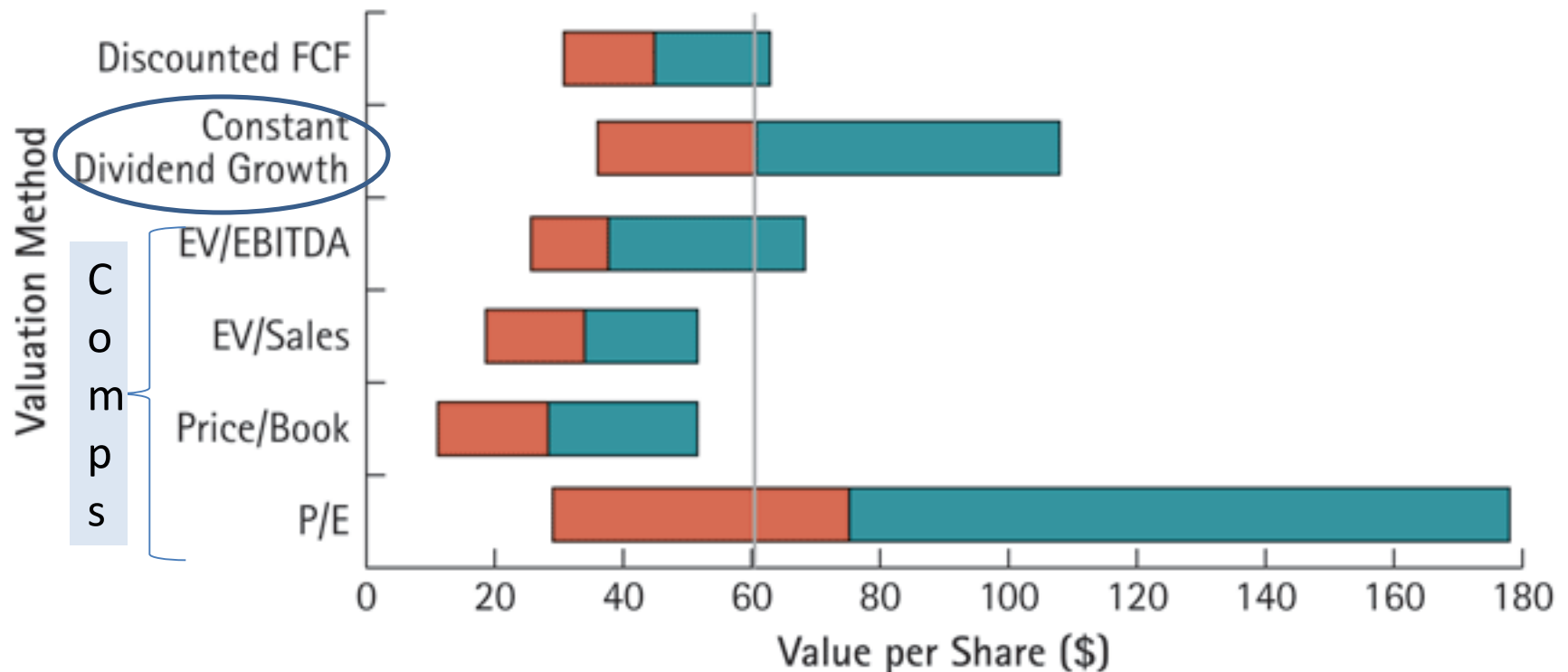
If dividend growth is constant

$$P_0 = \frac{Div_1}{r_E - g}$$

If early growth is variable
followed by constant growth

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \left(\frac{1}{(1 + r_E)^N} \right) \left(\frac{Div_{N+1}}{r_E - g} \right)$$

Range of Valuations for Nike Stock Using Various Valuation Methods



Your Turn!

- NoGrowth Industries presently pays an annual dividend of \$1.20 per share and it is expected that these dividend payments will continue indefinitely. If NoGrowth's equity cost of capital is 10%, then the value of a share of NoGrowth's stock is closest to _____.

- A) \$9.60
- B) \$14.40
- C) \$13.20
- D) \$12.00

Answer D



Solution to Question 1

$$P_0 = \frac{\textit{Dividend}_1}{r_E - g} = \frac{\$1.2}{(0.1 - 0)} = \$12$$

- The value of a share of NoGrowth's stock is closest to \$12.