Module 6: Equity Securities

(BUSFIN 4221 - Investments)

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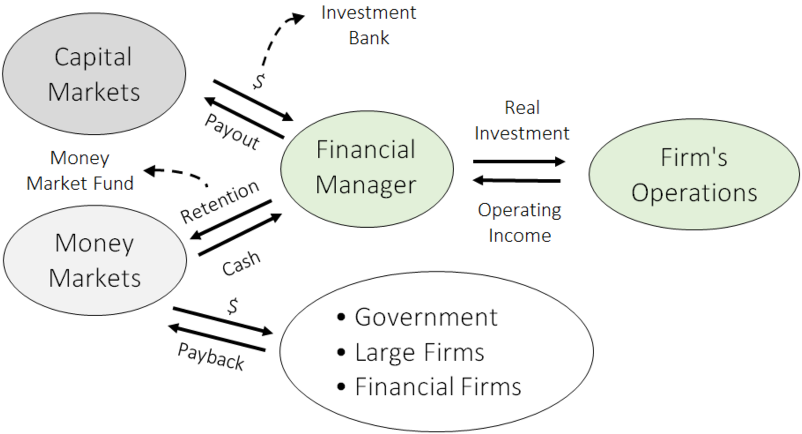
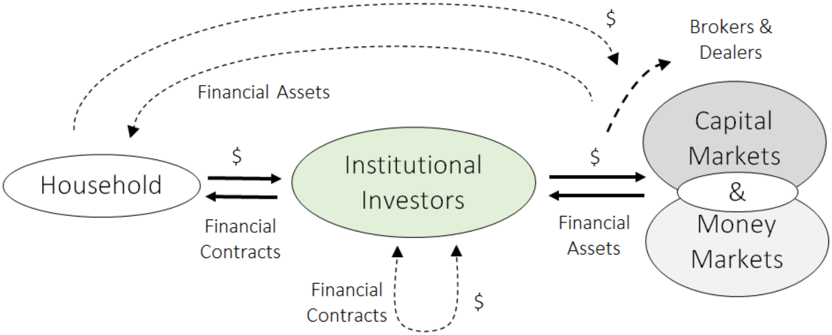
Module 1 - The Demand for Capital



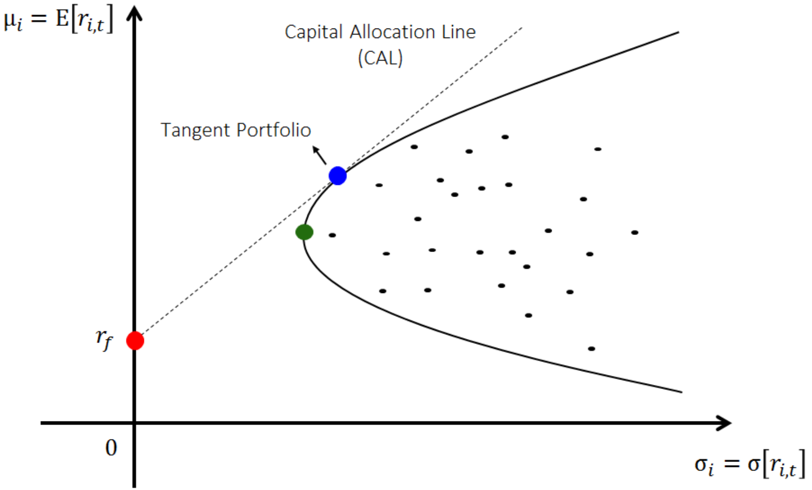
Module 1 - The Supply of Capital



Module 1 - Investment Principle

$$PV_t = \sum_{h=1}^{\infty} \frac{\mathbb{E}_t \left[CF_{t+h} \right]}{\left(1 + dr_{t,h}\right)^h}$$

Module 2 - Portfolio Theory



Module 3 - Factor Models

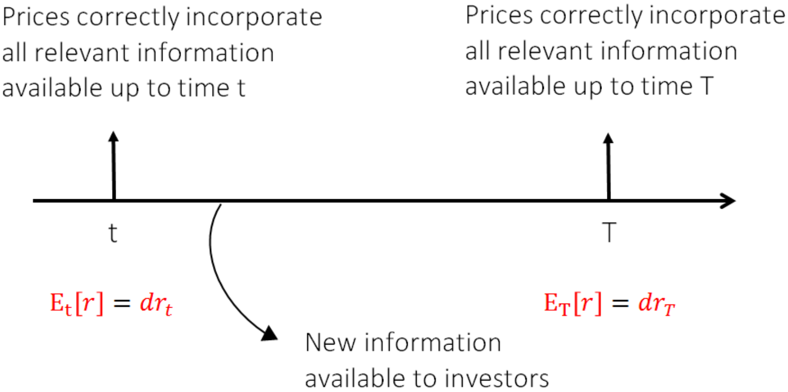
$$\mathbb{E}[r_i] = r_f + \beta_i \cdot (\mathbb{E}[r_M] - r_f)$$

$$+ \beta_{i,A} \cdot \mathbb{E}[r_A - r_a]$$

$$+ \beta_{i,B} \cdot \mathbb{E}[r_B - r_b]$$

$$+ ...$$

Module 4: Market Efficiency



Module 5: Debt Securities

$$P_t = \frac{c \cdot F}{(1+y)^1} + \frac{c \cdot F}{(1+y)^2} + ... + \frac{c \cdot F + F}{(1+y)^H}$$

This Module: Equity Securities

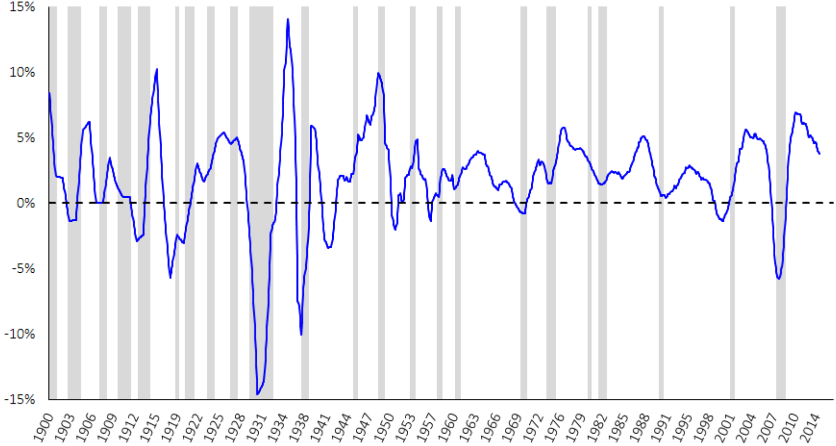
$$P_t = \frac{\widehat{D}_{t+1}}{(1+dr)^1} + \frac{\widehat{D}_{t+2}}{(1+dr)^2} + \frac{\widehat{D}_{t+3}}{(1+dr)^3} + \ldots$$

where $\widehat{D}_{t+h} = D_t \cdot (1+\widehat{g})^h$

This Section: Macroeconomic and Industry Analysis

- Before dinging into equity valuation, we need to make our asset allocation decision. How much should go to equities? How much should go to any particular industry?
- This depends heavily on how well you think equities (or an industry) will perform relative to alternative asset classes.
- Predicting economic conditions better than other investors allows you to time the market through proper asset allocation
- In this section, we will learn:
  - How to evaluate current economic conditions
  - How to think about government macroeconomic policy in order to form a forward looking perspective about economic activity
  - How to select an industry once you have a view about current/future economic conditions

Economic Condition Matters: Average Dividend Growth over Following 2 Years*



Explaining the Previous Slide

A forecast of future dividend growth is one of the key inputs in equity valuation. The previous graph demonstrates that future dividend growth varies a lot based on economic conditions. It plots the future two year average dividend growth at each point in time and shows that it tends to be high in economic expansion periods (white background) and low in economic contraction/recessionary periods (gray background).

For investors, this means that knowing whether we are currently in an economic expansion or an economic contraction is extremely valuable information to be able to properly forecast future dividend growth. Similarly, being able to forecast for how long the expansion/recession will last is also valuable information.

Macroeconomics: The "State of the Economy"

- How good is the economy today? Are we growing or contracting?
- The translation of these questions to economic jargon is "What is the current state of the economy?"
- There are many variables used to characterize the state of the economy, but three are particularly important:
  - Gross Domestic Product (GDP):
    Economy's total production of goods & services
  - Inflation: rate at which prices are rising
    ("overheated economies": demand grows faster than supply)
  - Unemployment Rate: % of total labor force yet to find work

Macroeconomics: Supply & Demand Shocks

- What can affect the state of the economy? Changes to goods & services demand/supply (i.e., demand/supply shocks)
- The following goods & services equation makes this obvious:

$$\text{Demand} = \text{Supply} = \text{GDP}$$

- Demand shocks: GDP & Inflation move in the same direction
  - $\uparrow$ Demand $\Rightarrow$ $\uparrow$ GDP growth & $\uparrow$ Inflation
  - $\downarrow$ Demand $\Rightarrow$ $\downarrow$ GDP growth & $\downarrow$ Inflation
  - Example: Brazil decides to increase medicine imports from US
- Supply shocks: GDP & Inflation move in opposite directions
  - $\uparrow$ Supply $\Rightarrow$ $\uparrow$ GDP growth & $\downarrow$ Inflation
  - $\downarrow$ Supply $\Rightarrow$ $\downarrow$ GDP growth & $\uparrow$ Inflation
  - Example: Improvement in workforce educational level

Macroeconomics: Government & "State of the Economy"

- How can the government influence the state of the economy?
- Through macroeconomic policy aimed to affect demand/supply of goods and services in the economy:
  - $\uparrow$ Demand/Supply of Goods & Services $\Rightarrow$ $\uparrow$ Economic Growth
  - $\downarrow$ Demand/Supply of Goods & Services $\Rightarrow$ $\downarrow$ Economic Growth
- Example: a consumer tax cut increases the money consumers have, which tends to increase the demand for goods and services and, of course, induce higher GDP growth.
- The problem is that some macroeconomic policies induce distortions into prices, which can have unintended consequences. One example is that a higher demand can induce higher inflation

Macroeconomics: Government & "State of the Economy"

- The government uses demand-side and supply-side policies
- Demand-side policies: induce an "artificial" demand shock
  - Fiscal Policy: government's spending and tax decisions

    Example: When the government spends more it creates an extra demand for goods and services
  - Monetary Policy: manipulation of money supply

    Example: Fed prints money and buys treasury securities in secondary markets. This is new money in circulation
- Supply-side policies: induce an "artificial" supply shock
  - These policies treat the issue of the productive capacity of the economy and tend to operate through tax policy. The goal is to improve incentives and ability to produce and develop goods
  - Example: lower marginal tax rate induces workers to prefer to work (over leisure time), which can induce economic growth

Below are some titles of articles released in the press. Classify each of them (based on the respective title) as a positive/negative demand/supply shock:

(i) "How drought and extreme heat are killing the world's crops"
(Times, 6th of January 2016)

(ii) "Our public education system is failing"
(CNBC, 9th of August 2016)

(iii) "Fed to buy $600 billion in treasuries to aid growth"
(Bloomberg, 3rd of November 2010)

a) (i) Negative Demand Shock; (ii) Negative Demand Shock; (iii) Positive Supply Shock

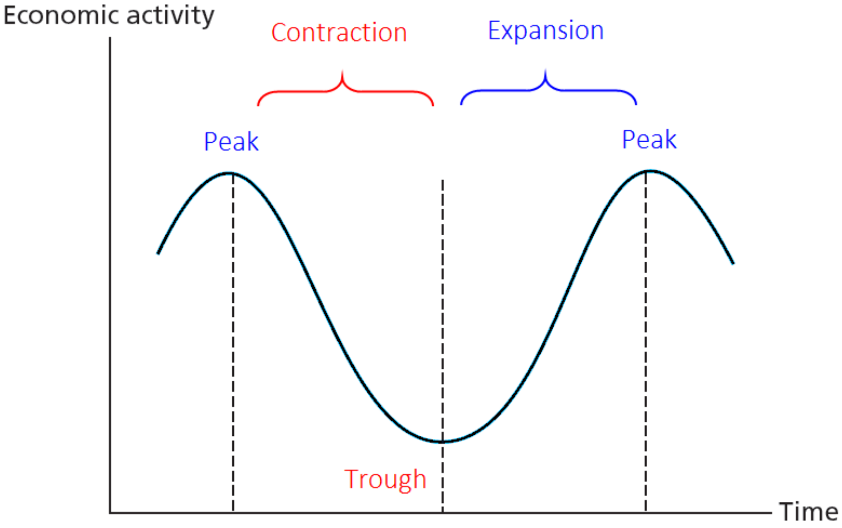
b) (i) Negative Supply Shock; (ii) Negative Demand Shock; (iii) Positive Demand Shock

c) (i) Negative Demand Shock; (ii) Negative Supply Shock; (iii) Positive Supply Shock

d) (i) Negative Supply Shock; (ii) Negative Supply Shock; (iii) Positive Demand Shock

e) (i) Positive Demand Shock; (ii) Positive Demand Shock; (iii) Negative Supply Shock

Business Cycle*



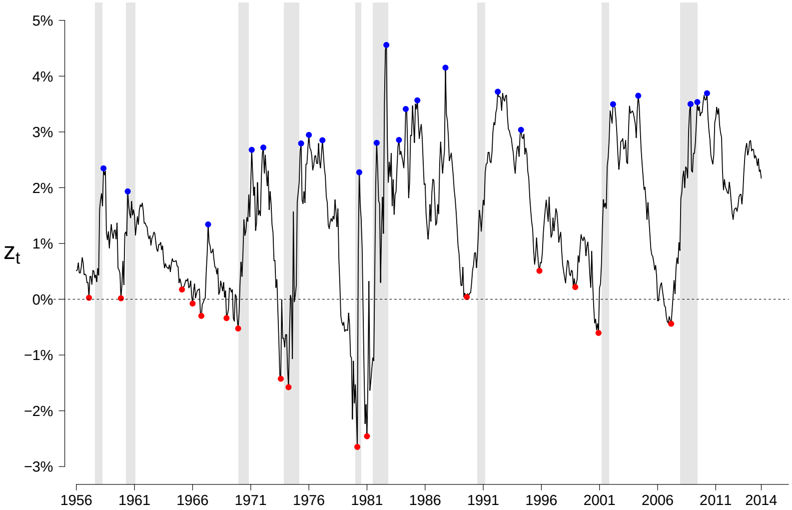
Explaining the Previous Slide

Even though the federal government has some tools to influence the state of the economy, it is unable to fully control it. As such, we have periods of expansion (or growth) and contraction (or recession).

Macroeconomists tend to think about the state of the economy as moving from expansions to contractions and vice versa. These alternate movements are called “business cycles”. This graph displays a highly stylized business cycle. It starts at the end of an expansionary period (called a peak) and enters a contrationary period. It then reaches the end of the contrationary period (called a trough) and enters another expansionary period. This process repeats itself over and over.

Of course, real business cycles have more realistic properties. For instance, the recessionary periods tend to be much shorter. While expansionary periods display moderate increase in economic activity over several years, recessionary periods tend to display sharp decreases in economic activity over a short period of time (but with catastrophic effects given their magnitude).

Business Cycle: z_t = Long Term Yield - Short Term Yield*



Explaining the Previous Slide

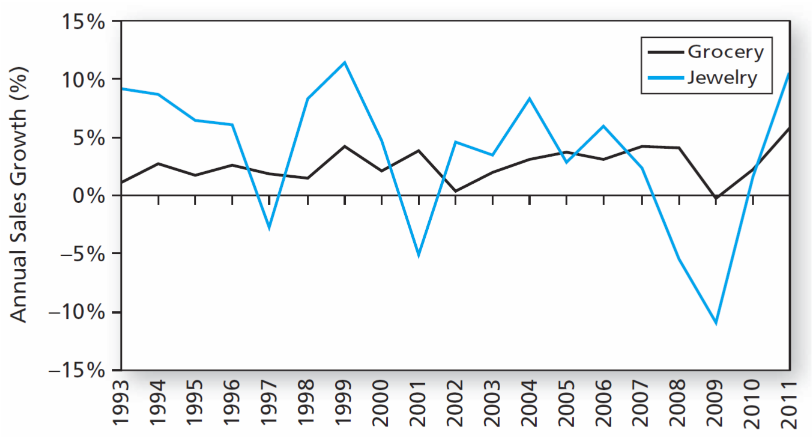
Business cycles are partially forecastable. To predict the business cycle, we use "leading indicators". These are variables (observable today) that tell us something about where the economy is heading.

One of the most famous leading indicators is the "term premium" (the difference between the yield to maturity of long-term treasuries relative to the yield to maturity of short-term treasuries). A high term premium tends to indicate high future economic growth while a low term premium tends to indicate poor future economic growth.

This pattern can be easily seen in the graph. Economic expansions have white background and economic contractions have gray background. Moreover, isolated high values of the term premium have a blue dot while isolated low values of the term premium have red dot. We can see that red dots tend to accumulate at the end of expansionary periods, right before an economic recessions is initiated. The opposite is true for blue dots.

Why does that happen? We learned in the previous module that a low term premium (flat or downward sloping yield curve) tends to indicate that investors expect a decrease in future interest rates (the opposite is true for high term premium). It turns out that government macroeconomic policy tends decrease interest rates during recessions and increase it during expansionary periods. As a consequence, a low term premium tend to predict future recessions.

Industries: Defensive vs Cyclical Industries*



Explaining the Previous Slide

Different industries have different exposure to the business cycle. Defensive industries are defined as the industries that are less sensitive to economic condition, while the opposite is true for cyclical industries.

This graph displays annual sales growth of two industries (Jewelry and Grocery). It is easy to see that sales of jewelries are much more volatile (and sensitive to business conditions) than sales of groceries.

The reason is that the Jewelry industry belongs to the consumer discretionary sector (consumers only buy jewelry when they are in good economic condition). In contrast, the grocery industry belongs to the Consumer Staples sector (consumers need to buy groceries whether economic conditions are good or not).

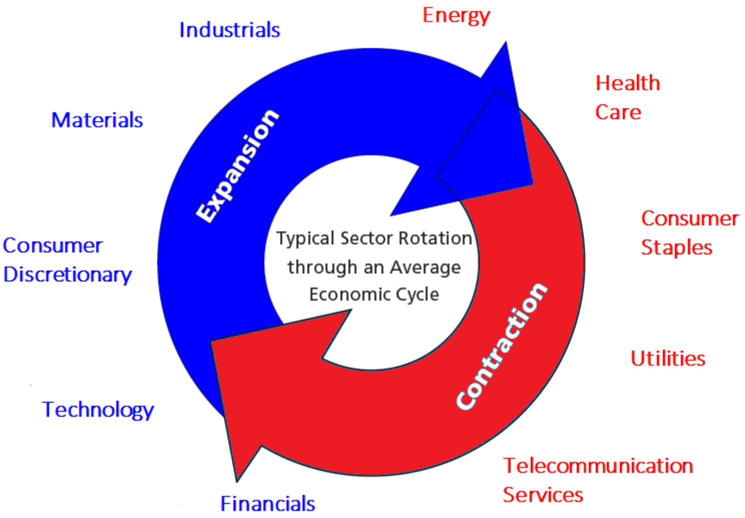
As a result, the Jewelry industry is a cyclical industry while the Grocery industry is a defensive industry.

Industries: Defensive vs Cyclical Industries

- Defensive industries (e.g., public utilities) are less sensitive to the business cycle while cyclical industries (e.g., durable goods) are more sensitive. Three key factors matter:

1. Sales sensitivity
   - High sales sensitivity ⇒ high sensitivity to business cycle
   - Low sales sensitivity: food, drugs and medical services
   - High sales sensitivity: steel, autos and transportation
2. Operating Leverage
   - High operating leverage ⇒ high sensitivity to business cycle
   - Fixed costs induce operating leverage
3. Financial Leverage
   - High financial leverage ⇒ high sensitivity to business cycle
   - Fixed costs induce operating leverage

Industries: Sector Rotation*



Explaining the Previous Slide

One equity strategy is to choose the sector to invest in based on your view on current (and future) economic conditions. At peaks and during economic contractions you would invest in defensive industries since they will not go down as much as others. However, in at troughs and during economic expansions you would invest in cyclical industries since these would benefit the most from the good economic conditions.

This diagram provides a stylized view of such strategy. At peak and during economic contractions you would invest in energy, heal care, consumer staples, utilities and telecommunication (all of these are sectors formed by defensive industries). In contrast, at troughs and during economic expansions you would invest in financials, technology, consumer discretionary, materials and industrials (all of these are sectors formed by cyclical industries).

Of course, if we take market efficiency as a reasonable approximation to reality, we have that such strategy will only give you your required rate of return and you would be requiring lower average returns (and taking less risk) during contractions relative to expansions. As such, for this strategy to generate risk-adjusted returns, you must be able to predict economic conditions better than other market participants (market efficiency would not perfectly apply in this case). Since all participants are using public information, you can only have an edge if you know how to analyze information better than others.

Suppose you manage an equity portfolio and the economy is currently in a recession period. If you predict we reached the trough and, thus, will soon enter an expansion period (which the market did not predict yet), you should shift your portfolio allocation to industries with:

a) (i) sales that are sensitive to business conditions; (ii) high operating leverage and (iii) high financial leverage

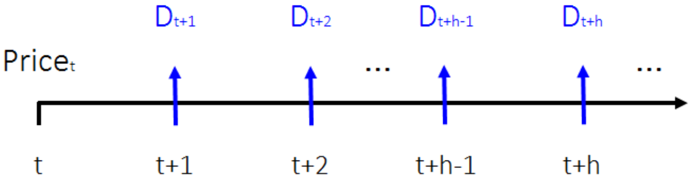
b) (i) sales that are insensitive to business conditions; (ii) high operating leverage and (iii) high financial leverage

c) (i) sales that are sensitive to business conditions; (ii) low operating leverage and (iii) low financial leverage

d) (i) sales that are insensitive to business conditions; (ii) low operating leverage and (iii) low financial leverage

e) (i) sales that are insensitive to business conditions; (ii) high operating leverage and (iii) low financial leverage

This Section: Equity Valuation



Valuation: The Emotional Approach

Valuation: The Dividend Discount Model (DDM)*

$$PV_t = \sum_{h=1}^{\infty} \frac{\mathbb{E}_t\left[CF_{t+h}\right]}{\left(1+dr_{t,h}\right)^h}$$

$$\Downarrow$$

$$P_t = \frac{\mathbb{E}_t\left[D_{t+1}\right]}{\left(1+dr_{t,1}\right)^1} + \frac{\mathbb{E}_t\left[D_{t+2}\right]}{\left(1+dr_{t,2}\right)^2} + \frac{\mathbb{E}_t\left[D_{t+3}\right]}{\left(1+dr_{t,3}\right)^3} + \ldots$$

$$= \frac{D_t \cdot \mathbb{E}_t\left[1+g_{t+1}\right]}{\left(1+dr_{t,1}\right)^1} + \frac{D_t \cdot \mathbb{E}_t\left[1+g_{t+2}\right]^2}{\left(1+dr_{t,2}\right)^2} + \frac{D_t \cdot \mathbb{E}_t\left[1+g_{t+3}\right]^3}{\left(1+dr_{t,3}\right)^3} + \ldots$$

$$P_0 = \frac{D_0 \cdot \left(1+\widehat{g}_1\right)}{\left(1+dr\right)^1} + \frac{D_0 \cdot \left(1+\widehat{g}_2\right)^2}{\left(1+dr\right)^2} + \frac{D_0 \cdot \left(1+\widehat{g}_3\right)^3}{\left(1+dr\right)^3} + \ldots$$

- dr is the long-run return investors require to hold the stock

Explaining the Previous Slide

In the previous module, we focused on asset allocation decisions over the business cycle. However, within an asset class (or industry) investors want to hold stocks that have an attractive price. To determine what an attractive price is, we need to be able to value the stock. When valuing stocks, the fundamental valuation equation can be reduced to (this is called the Dividend Discount Model - DDM):

$$P_0 = \frac{D_0 \cdot \left(1 + \widehat{g}_1\right)}{(1+dr)^1} + \frac{D_0 \cdot \left(1 + \widehat{g}_2\right)^2}{(1+dr)^2} + \frac{D_0 \cdot \left(1 + \widehat{g}_3\right)^3}{(1+dr)^3} + \ldots$$

There are two key inputs to be able to value a stock:

- The expected growth, $\widehat{g}$
- The long-run required rate of return (or long-run discount rate), dr

Of course, we also need to know current dividend per share, D_0, but this is unambiguous (you can look it up instead of estimating it).

Analysts spend an enormous amount of time trying to predict future growth to be able to understand to which extent a stock is fairly priced. We will explore growth predictions in a later section (Financial Statement Analysis). For now, what is important is to understand that given growth estimates and a reasonable discount rate, we can provide a value for any given stock by using the dividend discount model.

Valuation: Constant Growth DDM*

$$P_0 = \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + \frac{D_0 \cdot (1+\widehat{g}_2)^2}{(1+dr)^2} + \frac{D_0 \cdot (1+\widehat{g}_3)^3}{(1+dr)^3} + \ldots$$

- What if the firm already reached its stable growth stage?
- In this case, $\widehat{g}_h = \widehat{g}$ and the dividend discount models is:

$$P_0 = D_0 \times \sum_{h=1}^{\infty} \left(\frac{1+\widehat{g}}{1+dr} \right)^h$$

$$= D_0 \cdot \frac{1+\widehat{g}}{dr - \widehat{g}}$$

- $\uparrow \widehat{g} \quad \Longrightarrow \quad \uparrow P_0$
- $\uparrow dr \quad \Longrightarrow \quad \downarrow P_0$

Explaining the Previous Slide

If companies are expected to grow at a constant rate forever, then the Dividend Discount Model (DDM) can be simplified to:

$$P_0 = D_0 \cdot \frac{1+\widehat{g}}{dr - \widehat{g}}$$

- A higher expected growth, $\widehat{g}$, will induce a higher price (cash flows grow faster and, thus, have higher present value)
- A higher discount rate, dr, will induce a lower price (cash flows are discounted more strongly and, thus, have lower present value)

This is an extremely simplistic model, but it allows us to see the logic behind the general DDM in a very clear way (precisely because it is so simple).

This model is widely used in practice, but it has some unpleasant implications. For instance, it says that $\frac{P}{D}$ does not move over time. That is obviously not true in the data. Practitioners recognize these limitations and use the model accordingly (for instance, they estimate growth and discount rates period by period, effectively allowing $\frac{P}{D}$ vary over time even though this is inconsistent with the model implications).

Valuation: dr in a Constant Growth DDM

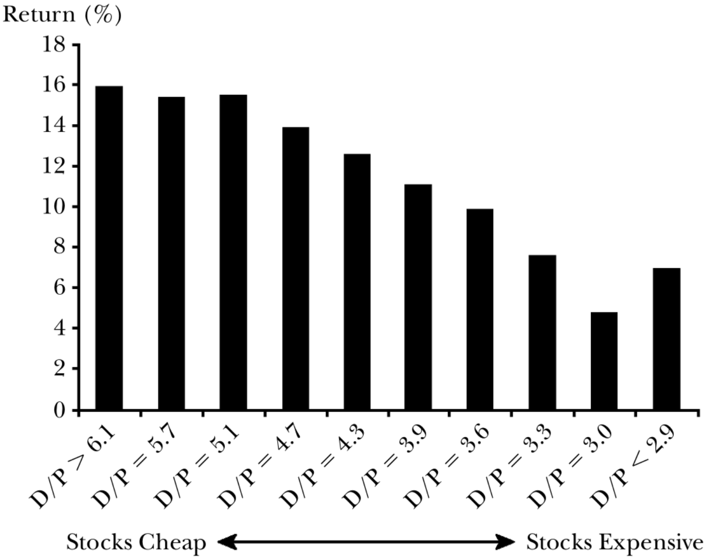
$$P_0 = D_0 \cdot \frac{1+\widehat{g}}{dr - \widehat{g}}$$

- Even when we have a good growth estimate, it is not obvious what rate of return should be required (i.e., dr is unknown)
- A better way to use the DDM is to look at current prices to figure out what rate of return markets currently require (called the "implied discount rate"). Then, we can ask ourselves whether we are satisfied with such rate of return:

$$dr = \underbrace{\frac{\widehat{D_1}}{P_0}}_{\textit{Dividend Yield}} + \underbrace{\widehat{g}}_{\textit{Growth Estimate}}$$

- Examples of how to use this "back of the envelope" approach: (i) Ford and (ii) Microsoft

Valuation*: $dr = \frac{\widehat{D_1}}{P_0} + \hat{g}$



Explaining the Previous Slide

The constant growth DDM implies: $dr = \frac{\widehat{D_1}}{P_0} + \widehat{g}$. If markets are efficient, then $\mathbb{E}_t[r] = dr$ and, thus: $\mathbb{E}_t[r] = \frac{\widehat{D_1}}{P_0} + \widehat{g}$.

This equation says that (holding expected dividend growth fixed), you can expect to receive higher returns going forward when current dividend to price ratio is higher. This is exactly what we find in the graph (it shows the average annual return over the following 10 years when the initial investment is made at different levels of dividend to price ratio).

This is part of the reason why the evidence on return predictability (such as the graph presented) cannot be interpreted as evidence against the efficient market hypothesis (it is actually quite consistent with it).

Obviously, the simple constant growth DDM is not true (in fact, if it were true, there would be no variation in dividend to price ratio). However, the logic that expected return should be high when dividend to price is high remains valid in more complicated dividend discount models.

Valuation: 2-Stage DDM

$$P_0 = \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + \frac{D_0 \cdot (1+\widehat{g}_2)^2}{(1+dr)^2} + \frac{D_0 \cdot (1+\widehat{g}_3)^3}{(1+dr)^3} + ...$$

- What if the firm is expected to grow at a different rate over the first 10 years before achieving a stable growth stage?
- In this case, growth is $\widehat{g}_1$ only over the first stage:

$$P_0 = \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + ... + \frac{D_0 \cdot (1+\widehat{g}_1)^{10}}{(1+dr)^{10}} + \frac{\widehat{P}_{t+10}}{(1+dr)^{10}}$$

- We need an estimate for "what the stock price will be 10 years from now".

Valuation: 2-Stage DDM

$$P_0 = \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + ... + \frac{D_0 \cdot (1+\widehat{g}_1)^{10}}{(1+dr)^{10}} + \frac{\widehat{P}_{t+10}}{(1+dr)^{10}}$$

- One approach is to use a constant growth DDM for $\widehat{P}_{t+10}$ with some stable growth estimate $\widehat{g}_2$:

$$P_0 = \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + ... + \frac{D_0 \cdot (1+\widehat{g}_1)^{10}}{(1+dr)^{10}} + \frac{D_{10} \cdot \frac{1+\widehat{g_2}}{dr-\widehat{g_2}}}{(1+dr)^{10}}$$

$$= \frac{D_0 \cdot (1+\widehat{g}_1)}{(1+dr)^1} + ... + \frac{D_0 \cdot (1+\widehat{g}_1)^{10}}{(1+dr)^{10}} + \frac{D_0 \cdot (1+\widehat{g}_1)^{10} \cdot \frac{1+\widehat{g_2}}{dr-\widehat{g_2}}}{(1+dr)^{10}}$$

- Let's see an example of a 2-Stage DDM using this approach.

Valuation: 2-Stage DDM

$$P_0 = \frac{D_0 \cdot (1+\hat{g}_1)}{(1+dr)^1} + \dots + \frac{D_0 \cdot (1+\hat{g}_1)^{10}}{(1+dr)^{10}} + \frac{\hat{P}_{t+10}}{(1+dr)^{10}}$$

- Another approach is to assume that the P/E ratio will converge to a given value, $\widehat{\frac{P}{E}}$:

$$P_0 = \frac{D_0 \cdot (1+\hat{g}_1)}{(1+dr)^1} + \dots + \frac{D_0 \cdot (1+\hat{g}_1)^{10}}{(1+dr)^{10}} + \frac{E_{10} \cdot \widehat{\frac{P}{E}}}{(1+dr)^{10}}$$

$$= \frac{D_0 \cdot (1+\hat{g}_1)}{(1+dr)^1} + \dots + \frac{D_0 \cdot (1+\hat{g}_1)^{10}}{(1+dr)^{10}} + \frac{E_0 \cdot (1+\hat{g}_1)^{10} \cdot \widehat{\frac{P}{E}}}{(1+dr)^{10}}$$

- Let's see an example of a 2-Stage DDM using this approach.
- We can extend the 2-Stage DDM to multiple growth stages.

Assume the Constant Growth DDM is true (that is, $P_0 = D_0 \cdot \frac{1+\widehat{g}}{dr-\widehat{g}}$). Suppose Walmart and Target currently have identical price to dividend ratio ($\frac{P_0}{D_0}$). If you:

- (i) require the same rate of return to invest in Walmart and Target
- (ii) (correctly) expect higher dividend growth for Target relative to Walmart

a) You should be indifferent between investing in Walmart or Target since you require the same rate of return for both

b) You should prefer to invest in Target even though it has same expected return as Walmart

c) You should prefer to invest in Walmart even though it has same expected return as Target

d) You should prefer to invest in Target since it has a higher expected return than Walmart

e) You should prefer to invest in Walmart since it has a higher expected return than Target

Valuation Ratios: Comparing Prices Across Firms

- Walmart stock price is not comparable to Target stock price.
- However, the price paid for each $ of earnings (dividends, cash flows, sales, book equity...) is. These are called "Valuation Ratios" or "Price Multiples"
- The most commonly used valuation ratio is the Price-Earnings ratio (P/E). Investors tend to have rules of thumb regarding the typical P/E for each industry.
- For instance, Walmart current P/E is around 14.8 while Target current P/E ratio is around 12.5. They are relatively close.
- Investors know the typical variation in P/E within any industry and when any particular firm in that industry has an unusual P/E it might be perceived as an (un)attractive investment.
- Let's see this happening in this Shark Tank Episode.

Valuation Ratios: Firm Value and Growth Opportunities

- Why is it reasonable to compare valuation ratios this way?
- Consider a firm that is able to generate earnings equivalent to 20% of its book-equity (i.e., the return on equity is 20%).
- If the firm never retains earnings, its book-equity will remain the same and it will generate a fixed E every year.
- In this case, the firm has no growth value and its price is $\mathrm{PV}_{\mathrm{NG}} = \frac{E}{dr}$ (the value of a perpetuity paying E every year)
- Of course, as long as $dr < 20\%$, it would be inefficient to not retain earnings (since the firm would be rejecting positive NPV projects)
- If managers take actions to benefit shareholders, then $P > \mathrm{PV}_{\mathrm{NG}}$, where the extra component of P reflects the present value of growth opportunities ($\mathrm{PV}_{\mathrm{GO}}$):

$$P = \mathrm{PV}_{\mathrm{NG}} + \mathrm{PV}_{\mathrm{GO}}$$

Valuation Ratios: $^{P}/_{E}$, Growth Opportunities and dr

$$P = \underbrace{\mathrm{PV}_{\mathrm{NG}}}_{E/dr} + \underbrace{\mathrm{PV}_{\mathrm{GO}}}_{P - E/dr}$$

- Dividing both sides of the equation by E and rearranging:

$$\frac{P}{E} = \frac{1}{dr} \cdot \left[1 + \frac{\mathrm{PV}_{\mathrm{GO}}}{\mathrm{PV}_{\mathrm{NG}}}\right]$$

- Two characteristics determine $^{P}/_{E}$
  - $\uparrow$ relative value of growth opportunities $(\frac{\mathrm{PV}_{\mathrm{GO}}}{\mathrm{PV}_{\mathrm{NG}}}) \Rightarrow \uparrow {}^{P}/_{E}$
  - $\uparrow dr \Rightarrow \downarrow {}^{P}/_{E}$
- Comparing firms based on valuation ratios relies on the idea that firms in the same industry have similar risks (reflected in dr) and growth opportunities (reflected in $\frac{\mathrm{PV}_{\mathrm{GO}}}{\mathrm{PV}_{\mathrm{NG}}}$).

In January of 2016, Amazon.com $^P/_E$ ratio was around 840, which is extremely high (even in comparison to its industry/competitors). Considering this situation, which of the following statements is true regarding Amazon.com?

a) Either its stock price has a relative growth component much larger than its competitors or investors require extremely low required rates of return to invest in it (or both)

b) Either its stock price has a relative growth component much lower than its competitors or investors require extremely low required rates of return to invest in it (or both)

c) Either its stock price has a relative growth component much larger than its competitors or investors require extremely high required rates of return to invest in it (or both)

d) Either its stock price has a relative growth component much lower than its competitors or investors require extremely high required rates of return to invest in it (or both)

e) Such high $^P/_E$ can only be explained by market irrationality, which indicates that Amazon stock was a great investment as of January 2016

This Section: Financial Statement Analysis

- Equity valuation strongly relies on growth estimates, $\widehat{g}$
- Moreover, the decision to invest in a given stock depends on whether your require rate of return, dr, is lower or higher than the one implied by current prices
- Both $\widehat{g}$ and dr depend on company's prospects (is it risky? what is its sustainable growth?)
- Financial statement analysis helps us understand these better
- In this section, we learn (i) how the key financial statements work and (ii) what information we should focus on when trying to determine $\widehat{g}$ and dr

Aggregate Balance Sheet

ASSETS			LIABILITIES & SHAREHOLDERS' EQUITY		
Account	**$ Million**	**% of Total Assets**	**Account (Compustat Code)**	**$ Million**	**% of Total Assets**
Total Assets (AT)	**$75,030,714**	**100.0%**	**Total Liabilities (LT)**	**$75,030,714**	**81.0%**
Current Assets	$30,762,592	41.0%	Current Liabilities	$41,792,108	55.7%
Cash	$7,653,133	10.2%	Debt due for Repayment	$9,003,686	12.0%
Receivables	$10,954,484	14.6%	Accounts Payable	$25,960,627	34.6%
Inventories	$5,027,058	6.7%	Other Current Liabilities	$6,827,795	9.1%
Inv. & Markeatable Securities	$5,852,396	7.8%			
Other Current Assets	$1,275,522	1.7%	Long-Term Debt	$11,704,791	15.6%
Fixed Assets	$36,089,773	48.1%	Deferred Liabilities	$2,325,952	3.1%
Property, Plant & Equipament	$33,913,883	45.2%			
Other Long-Term Assets	$2,175,891	2.9%	Other Long-Term Liabilities	$4,952,027	6.6%
Intangible Assets	$6,452,641	8.6%	**Shareholders' Equity**	**$14,255,836**	**19.0%**
Other Assets	$1,725,706	2.3%	Preferred Stock	$300,123	0.4%
			Paid-in Capital	$6,752,764	9%
			Retained Earnings	$7,202,949	9.6%

Aggregate Income Statement

	Account	$ Billion	% of Revenue	Summary
(+)	**Operating Revenues**	**$20,757**	**100.0%**	REV
	Net Sales	$20,757	100.0%	
(−)	**Operating Expenses**	**$18,141**	**87.4%**	OE
	Cost of Goods Sold	$13,347	64.3%	
	Selling, General & Adm Expenses	$3,736	18.0%	
	Depreciation & Amortization	$1,059	5.1%	
=	**Earnings Before Interest & Taxes**	**$2,615**	**12.6%**	$\text{EBIT} = \text{REV} - \text{OE}$
(−)	Interest Expenses	$42	0.2%	IE
=	**Earnings Before Taxes (or Taxable Income)**	**$2,574**	**12.4%**	$\text{EBT} = \text{EBIT} - \text{IE}$
(−)	Income Taxes	$1,474	7.1%	TX
=	**Earnings (or Net Income)**	**$1,100**	**5.3%**	$\text{E} = \text{EBT} - \text{TX}$
=	Common Stock Dividends	$519	2.5%	$\text{D} = (1 - \text{b}) \cdot \text{E}$
(+)	Addition to Retained Earnings	$581	2.8%	$\Delta\text{RE} = \text{b} \cdot \text{E}$

PS: I am omitting some pieces of the income statements (e.g., when firms have non-operating income/losses, there is an extra layer to distinguish "Operating Income" from EBIT). The omitted pieces are irrelevant for our purpose since they add basically no information for most firms, but they can be important for specific firms

Dividend Growth = Plowback Ratio × Return on Equity

$$D = (1 - b) \cdot E$$

- The plowback ratio (b) links dividends (D) to earnings (E). If firm policy induces a stable b, then dividend growth (g) is equal to earnings growth, which motivates us to explore E.
- The fraction of earnings retained in the firm increases (book) equity:

$$\text{Equity}_t = \text{Equity}_{t-1} + b \cdot E_t$$

$$\Downarrow$$

$$\underbrace{\frac{\text{Equity}_t}{\text{Equity}_{t-1}}}_{1+g} = 1 + b \cdot \underbrace{\frac{E_t}{\text{Equity}_{t-1}}}_{\text{ROE}}$$

- With a stable Return on Equity (ROE), growth in earnings is equivalent to growth in (book) equity and, thus: $g = b \cdot \text{ROE}$

Profitability: ROA and ROE

$$g = b \cdot \text{ROE}$$

- We can predict dividend growth by forecasting Return on Equity (ROE), which is a profitability measure.
- ROE is strongly related Return on Assets: $\text{ROA} = \frac{\text{EBIT}}{\text{Assets}}$ (EBIT is Earnings Before Interest and Taxes)
- ROA represents how much stakeholders (equity and debt holders) earn (combined) relative to their position. Think of it as the profitability of firms operations.
- In contrast, ROE represents how much equity holders earn relative to their position. It accounts for financing decisions (interest payments) as well as taxes.

Profitability: ROA, ROE and Leverage

$$\text{ROA} = \frac{\text{EBIT}}{\text{Assets}} \quad \text{and} \quad \text{ROE} = \frac{\text{E}}{\text{Equity}}$$

- Ignoring taxes, ROA is linked to ROE through leverage:

$$\text{ROE} = \text{ROA} + (\text{ROA} - \text{Interest Rate}) \cdot \frac{\text{Debt}}{\text{Equity}}$$

- If $\text{ROA} > \text{Interest Rate}$, leverage induces $\text{ROE} > \text{ROA}$.
- If $\text{ROA} < \text{Interest Rate}$, leverage induces $\text{ROE} < \text{ROA}$.
- Higher leverage ($\frac{\text{Debt}}{\text{Equity}}$) makes these effects stronger.
- To account for taxes, we need to multiply the ROE formula by $(1 - \text{Tax Rate})$ if $\text{ROE} > 0$, but same logic applies.

Profitability: Decomposing ROE and ROA

$$\text{ROA} = \underbrace{\frac{\text{Sales}}{\text{Assets}}}_{\text{Turnover}} \times \underbrace{\frac{\text{EBIT}}{\text{Sales}}}_{\text{Profit Margin}}$$

- $\uparrow$ Turnover and/or $\uparrow$ Profit Margin $\implies \uparrow$ ROA.
- We can also understand ROE better by decomposing it:

$$\text{ROE} = \underbrace{\frac{\text{Assets}}{\text{Equity}}}_{\text{Leverage}} \times \underbrace{\frac{\text{Sales}}{\text{Assets}}}_{\text{Turnover}} \times \underbrace{\frac{\text{EBIT}}{\text{Sales}}}_{\text{Profit Margin}} \times \underbrace{\frac{\text{EBT}}{\text{EBIT}}}_{\text{Interest burden}} \times \underbrace{\frac{\text{E}}{\text{EBT}}}_{\text{Tax burden}}$$

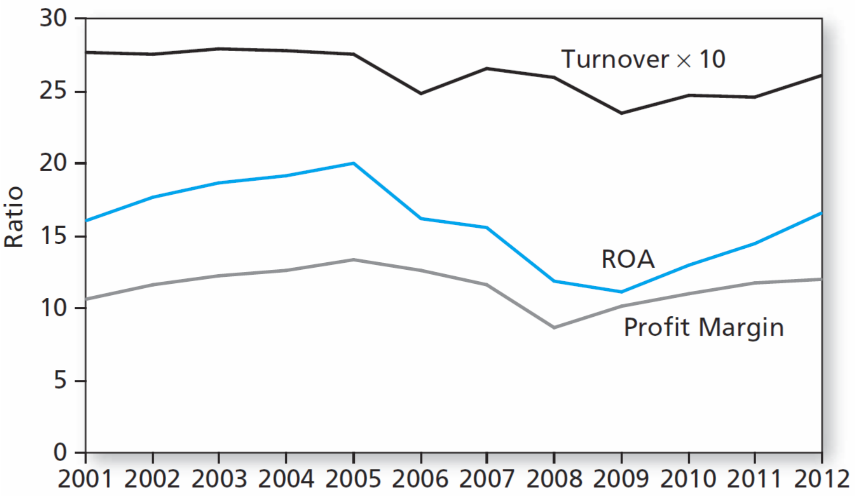
$$= \underbrace{\frac{\text{EBIT}}{\text{Assets}}}_{\text{ROA}} \times \underbrace{\frac{\text{EBT}}{\text{EBIT}} \times \frac{\text{Assets}}{\text{Equity}}}_{\text{Compound Leverage Effect}} \times \underbrace{\frac{\text{E}}{\text{EBT}}}_{\text{Tax burden}}$$

Profitability: ROE in Bad and Good times

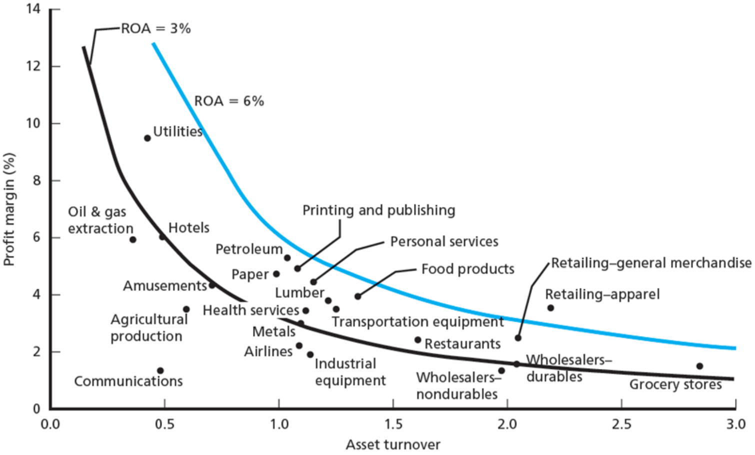
	ROE =	Leverage ×	Turnover ×	Profit Margin ×	Interest Burden ×	Tax Burden
	$\frac{E}{Equity}$	$\frac{Assets}{Equity}$	$\frac{Sales}{Assets}$	$\frac{EBIT}{Sales}$	$\frac{EBT}{EBIT}$	$\frac{E}{EBT}$
				Bad Year		
Debt = 0	3%	1.0	80%	6%	100%	60%
Debt > 0	2%	1.7	80%	6%	36%	60%
				Normal Year		
Debt = 0	6%	1.0	100%	10%	100%	60%
Debt > 0	7%	1.7	100%	10%	68%	60%
				Good Year		
Debt = 0	9%	1.0	120%	13%	100%	60%
Debt > 0	12%	1.7	120%	13%	79%	60%

- ROE is low in bad times and high in good times
- ROA ($\text{Turnover} \times \text{Profit Margin}$) is responsible for this variation, with Interest Burden amplifying the effect for levered firms

Profitability: Both ROA Components fall in Recessions (Home Depot)



Profitability: ROA = Turnover × Profit Margin (Across Industries)*



Explaining the Previous Slide

ROE depends on ROA, which depends on Turnover ($\frac{\text{Sales}}{\text{Assets}}$) and Profit Margin ($\frac{\text{EBIT}}{\text{Sales}}$). Firms/industries with high turnover tend to have low profit margin (and vice versa).

The reason is simple: when a product/service has high turnover and high profit margin, it is very profitable to produce/offer it and, thus, many firms enter the business, which lowers profit margin and (depending on demand) also turnover.

But what determines the mix of profit margin and turnover? "Everyday" products/services are the ones that tend to have very high turnover and, since many firms offer them, very low profit margin. For instance, industries like Groceries, Retailing and Restaurants have very high turnover and very low profit margin.

Risk: Firm Liquidity

- We can estimate growth from ROE estimates ($\mathrm{g} = \mathrm{b} \cdot \mathrm{ROE}$)
- The other input to firm valuation is the required rate of return, *dr* (to compare with the *dr* implied by prices)
- In our "Factor Model" module we saw that systematic risk should be a key determinant of *dr* (in the CAPM, that is β)
- However, how can we have a forward looking estimate of β?
- Financial Statement analysis can help us in this regard.
- ROE variation (studied in the previous slides) is one important dimension of risk and is linked to leverage.
- Another important dimension of risk is firm liquidity (the ability to pay its current obligations without substantial losses).

Risk: Key Liquidity Ratios

- If a firm has high liquidity, then it can survive bad economic times by selling assets when necessary
- If a firm has low liquidity, then it will sell assets at fire sale prices when in need of cash (and suffer a large loss)
- Example: firm has short-term debt due next month, but its assets are composed of real state and heavy machinery.
- The main liquidity ratios are:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\text{Quick Ratio} = \frac{\text{Cash} + \text{Marketable Securities} + \text{Receivables}}{\text{Current Liabilities}}$$

$$\text{Cash Ratio} = \frac{\text{Cash} + \text{Marketable Securities}}{\text{Current Liabilities}}$$

Which of the following is true regarding Return on Equity (ROE)

a) Firms with high ROE are unlikely to grow much going forward since they are already very profitable

b) ROE varies across industries, but it does not vary over time

c) ROE is a measure of profitability. However, with stable payout/retention policy, ROE can reveal information about dividend growth

d) ROE can be obtained by calculating ROA (Return on Assets) and adjusting it for the effect of taxes

e) ROE of a levered firm is always below the ROE of an equivalent unlevered firm

References