# Module 6: Equity Securities

(BUSFIN 4221 - Investments)

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Fall 2016

# Outline

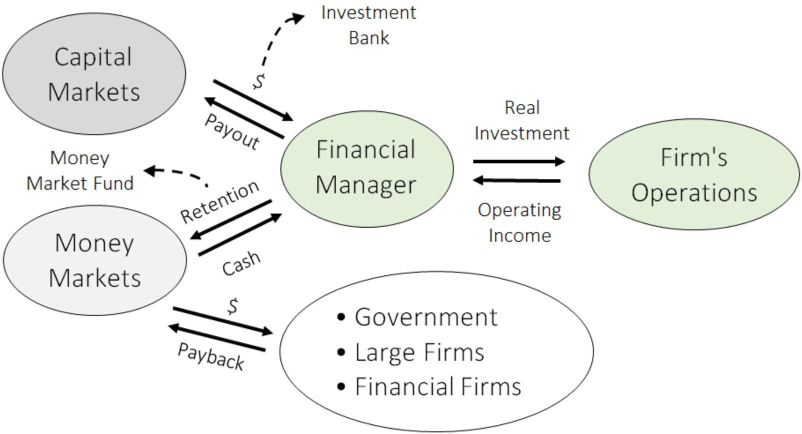
Overview

Macroeconomic and Industry Analysis

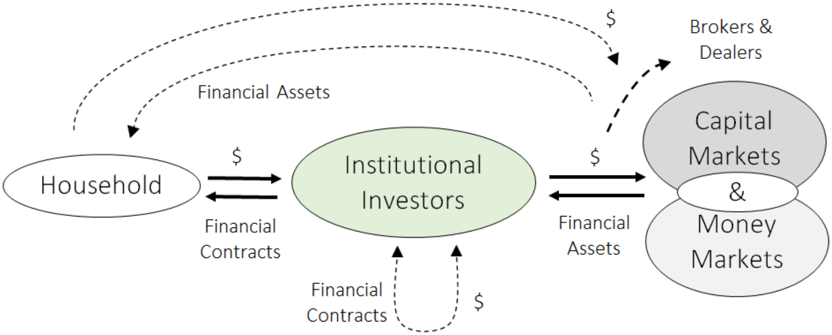
Equity Valuation

Financial Statement Analysis

# Module 1 - The Demand for Capital



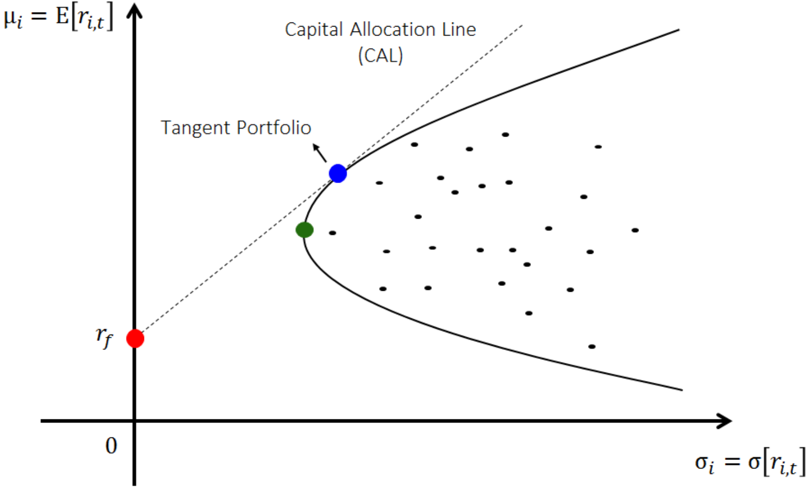
# Module 1 - The Supply of Capital



# 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

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

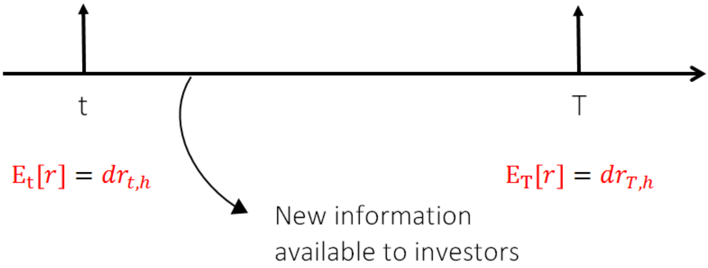
$$+ \beta_{i,A} \cdot \mathbb{E}[r_A - r_a]$$

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

$$+ \ldots$$

# Module 4: Market Efficiency

$$P_t = \sum_{h=1}^{\infty} \frac{E_t[CF_{t+h}]}{(1 + E_t[r])^h} \qquad P_T = \sum_{h=1}^{\infty} \frac{E_T[CF_{T+h}]}{(1 + E_T[r])^h}$$




$$E_t[r] = dr_{t,h} \qquad E_T[r] = dr_{T,h}$$

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

# Outline

# 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

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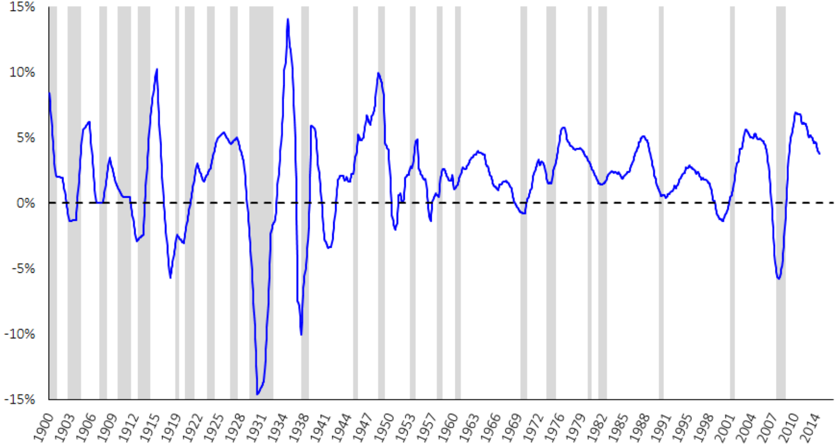
# Economic Condition Matters: Average Dividend Growth over Following 2 Years*



# 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
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- 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
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# 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

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- 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
  - Monetary Policy: manipulation of money supply
- 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

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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

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**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

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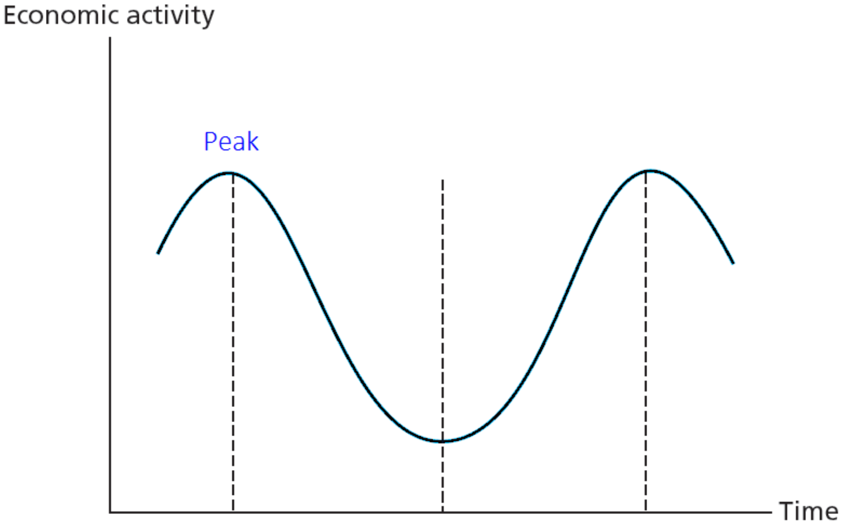
**e)** (i) Positive Demand Shock; (ii) Positive Demand Shock; (iii) Negative Supply Shock

# Business Cycle*



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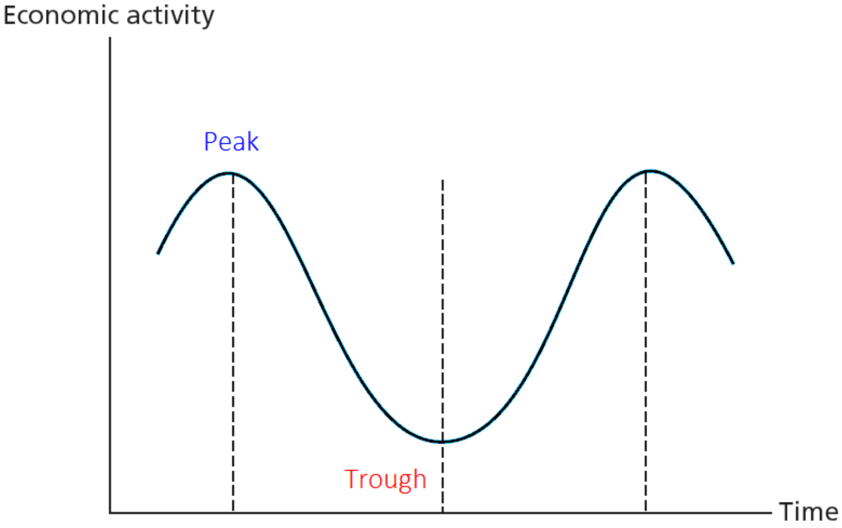

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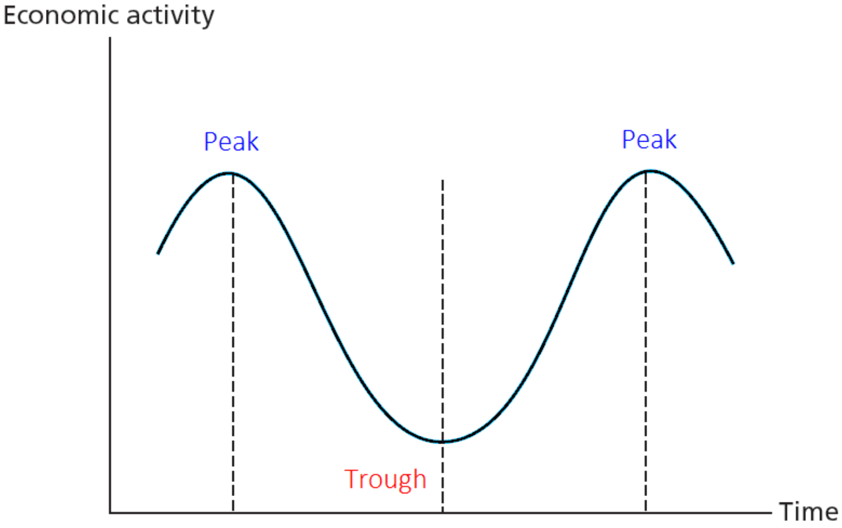

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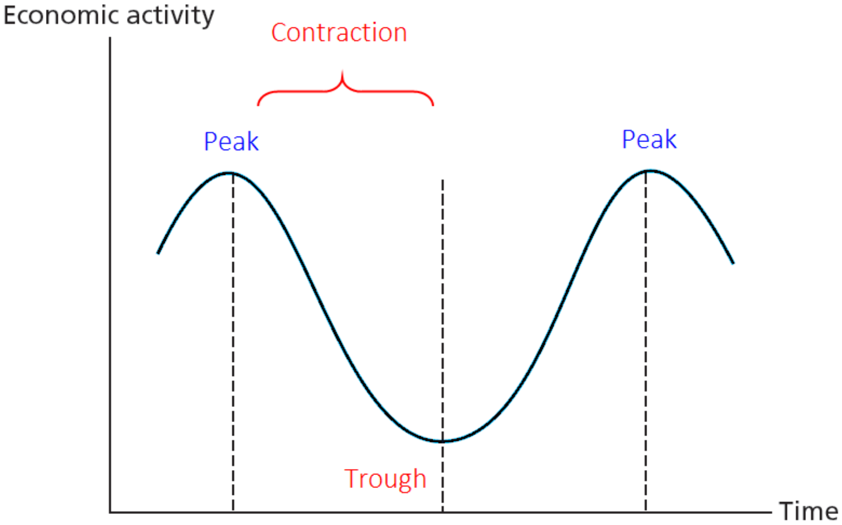

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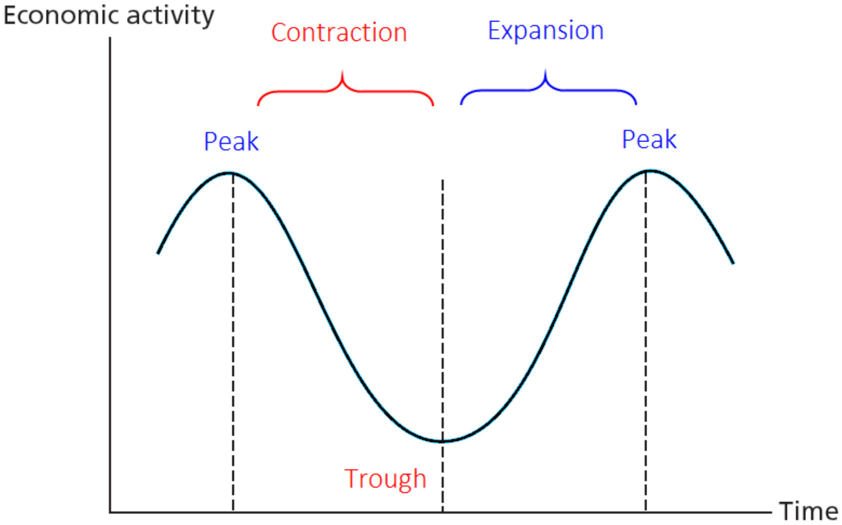
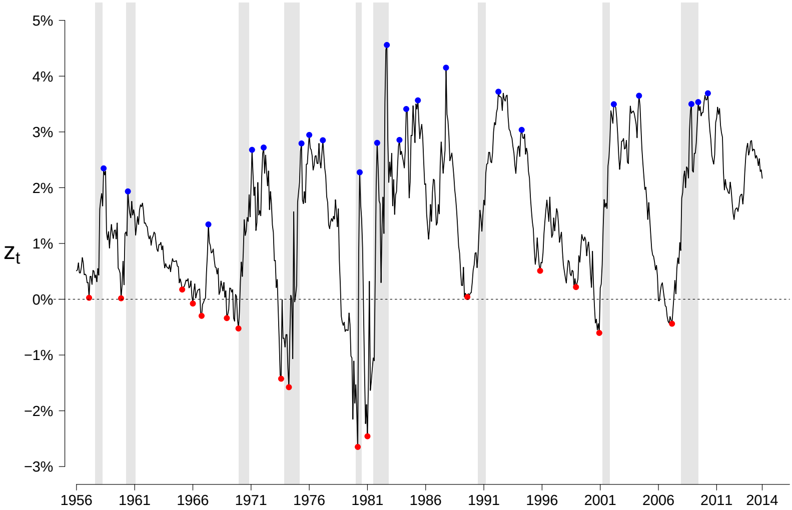
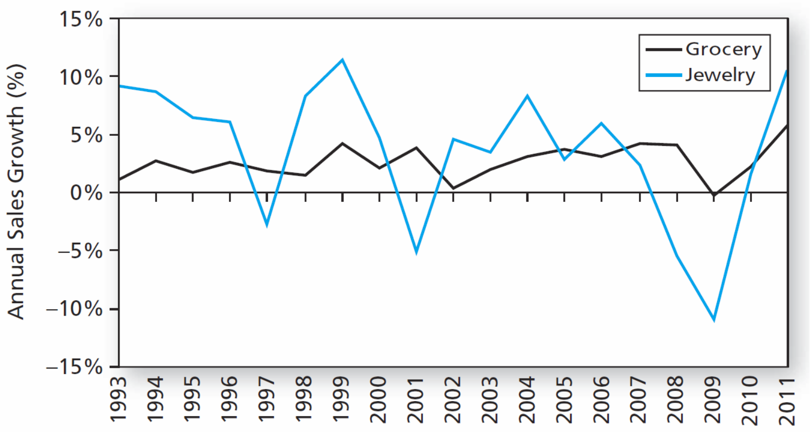


# Business Cycle: $z_t$ = Long Term Yield - Short Term Yield*



# Industries: Defensive vs Cyclical Industries*



# 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
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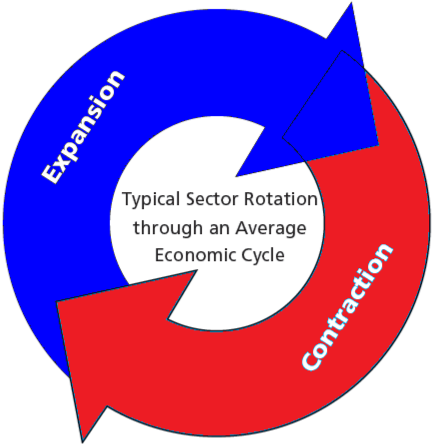
# Industries: Sector Rotation*



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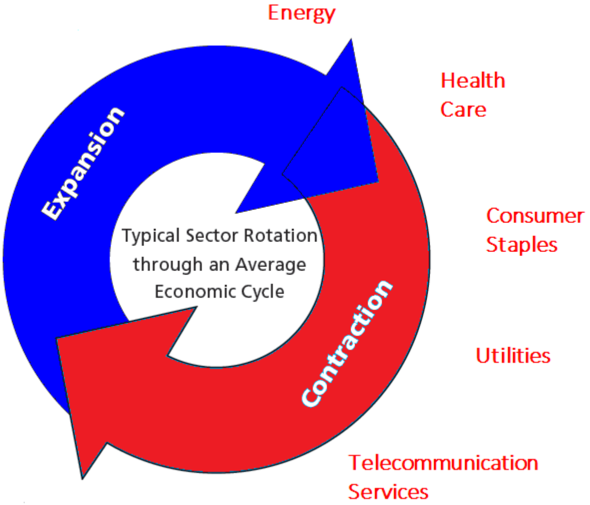

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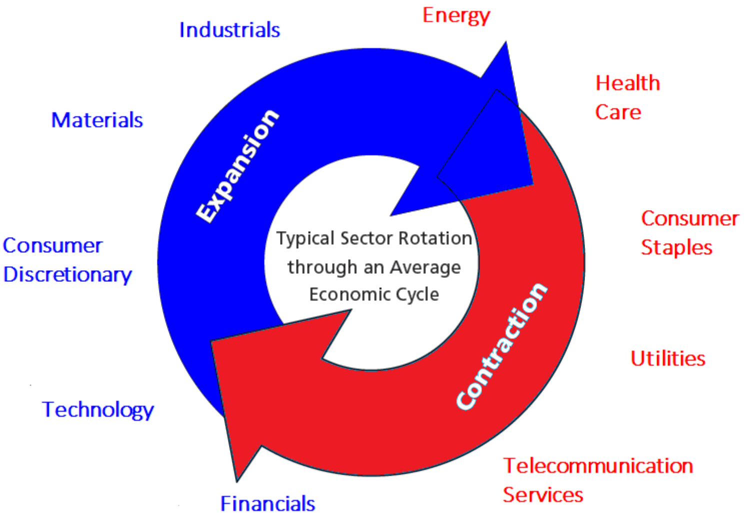

Suppose you manage an equity portfolio and the economy is currently in a recession period. If you predict we reached the trough and, thus, will soon enter an expansion period (which the market did not predict yet), you should shift your portfolio allocation to industries with:

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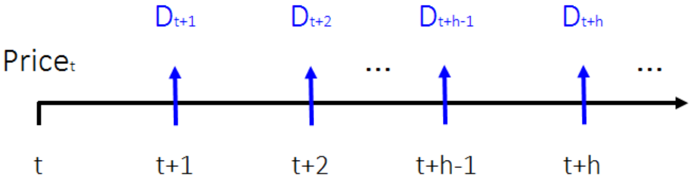
# Outline

# This Section: Equity Valuation



# Valuation: The Emotional Approach

# Valuation: The Dividend Discount Model (DDM)*

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

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

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

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$$\Downarrow$$

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

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- What if the firm already reached its stable growth stage?
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# 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:

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

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

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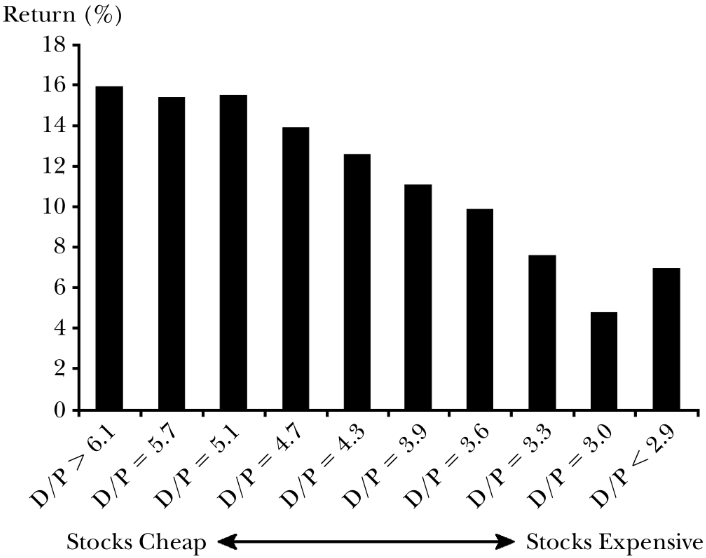

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- What if the firm is expected to grow at a different rate over the first 10 years before achieving a stable growth stage?
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- Another approach is to assume that the $^P/_E$ ratio will converge to a given value, $\widehat{\frac{P}{E}}$:

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

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

- 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

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# 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.
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# 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 ($\mathrm{PV}_{\mathrm{GO}}$):

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# 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:

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

- Two characteristics determine $P/E$
  - $\uparrow$ relative value of growth opportunities $\left(\frac{\mathrm{PV}_{\mathrm{GO}}}{\mathrm{PV}_{\mathrm{NG}}}\right) \longrightarrow \uparrow P/E$
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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)

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# Outline

Overview

Macroeconomic and Industry Analysis

Equity Valuation

Financial Statement Analysis

# 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 $dr$

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# 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%** | $EBIT = REV - OE$ |
| (−) | Interest Expenses | $42 | 0.2% | IE |
| = | **Earnings Before Taxes (or Taxable Income)** | **$2,574** | **12.4%** | $EBT = EBIT - IE$ |
| (−) | Income Taxes | $1,474 | 7.1% | TX |
| = | **Earnings (or Net Income)** | **$1,100** | **5.3%** | $E = EBT - TX$ |
| = | Common Stock Dividends | $519 | 2.5% | $D = (1 - b) \cdot E$ |
| (+) | Addition to Retained Earnings | $581 | 2.8% | $\Delta RE = b \cdot E$ |

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

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| (−) | **Operating Expenses** | **\$18,141** | **87.4%** | OE |
| | Cost of Goods Sold | \$13,347 | 64.3% | |
| | Selling, General & Adm Expenses | \$3,736 | 18.0% | |
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# Dividend Growth = Plowback Ratio × Return on Equity

$$\mathrm{D} = (1 - \mathrm{b}) \cdot \mathrm{E}$$

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

$$\mathrm{Equity}_t = \mathrm{Equity}_{t-1} + \mathrm{b} \cdot \mathrm{E}_t$$

$$\Downarrow$$

$$\underbrace{\frac{\mathrm{Equity}_t}{\mathrm{Equity}_{t-1}}}_{1+\mathrm{g}} = 1 + \mathrm{b} \cdot \underbrace{\frac{\mathrm{E}_t}{\mathrm{Equity}_{t-1}}}$$

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# Profitability: ROA and ROE

$$g = b \cdot ROE$$

- We can predict dividend growth by forecasting Return on Equity ($ROE$), which is a profitability measure.
- $ROE$ is strongly related Return on Assets: $ROA = \frac{EBIT}{Assets}$ (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.
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# 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, $\text{ROA}$ is linked to $\text{ROE}$ through leverage:

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

- If $\text{ROA} > \text{Interest Rate}$, leverage induces $\text{ROE} > \text{ROA}$.
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$$\text{ROA} = \frac{\text{EBIT}}{\text{Assets}} \quad \text{and} \quad \text{ROE} = \frac{\text{E}}{\text{Equity}}$$

- Ignoring taxes, $\text{ROA}$ is linked to $\text{ROE}$ 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.
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# 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 $\implies \uparrow \text{ROA}$.
- We can also understand $\text{ROE}$ better by decomposing it:

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# Profitability: ROE in Bad and Good times

| | ROE = | Leverage × | Turnover × | Profit Margin × | Interest Burden × | Tax Burden |
|---|---|---|---|---|---|---|
| | $\frac{\text{E}}{\text{Equity}}$ | $\frac{\text{Assets}}{\text{Equity}}$ | $\frac{\text{Sales}}{\text{Assets}}$ | $\frac{\text{EBIT}}{\text{Sales}}$ | $\frac{\text{EBT}}{\text{EBIT}}$ | $\frac{\text{E}}{\text{EBT}}$ |
| | | | 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 (Turnover × Profit Margin) is responsible for this variation, with Interest Burden amplifying the effect for levered firms

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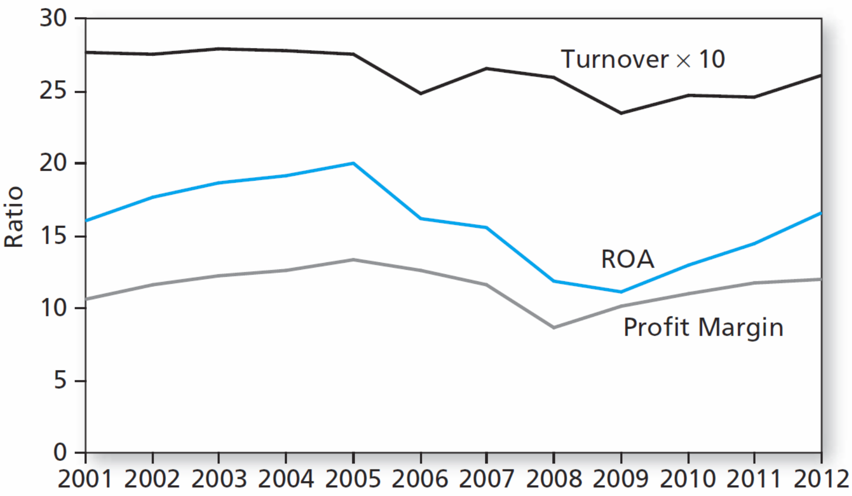
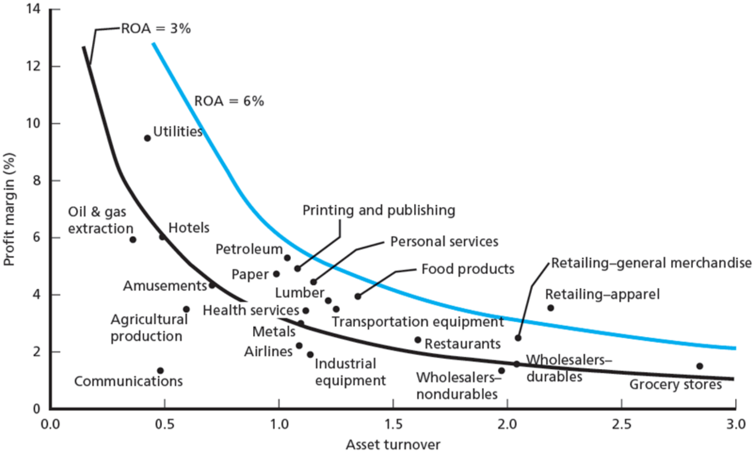
# Profitability: Both ROA Components fall in Recessions (Home Depot)



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



# Risk: Firm Liquidity

- We can estimate growth from ROE estimates ($g = b \cdot ROE$)
- 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 $\beta$)
- However, how can we have a forward looking estimate of $\beta$?
- Financial Statement analysis can help us in this regard.
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# 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:

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

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

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**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

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