Announcements

- Thursday class:
  - Analyzing financial statements
  - Bring a computer to class

Financial Statement Analysis

In Class

Overview

- Firms are required to file quarterly reports with the SEC (10-Ks and 10-Qs)
  - Financial statements and lots of text!

- Why study?
  - Lots of valuable information about the firm
  - May be used to find mis-valued securities
    - fundamental value ≠ market price

Fundamental Value

$$PV = \sum_{t=0}^{\infty} \frac{CF_t}{(1+r)^t}$$

$$= \sum_{t=0}^{T} \frac{CF_t}{(1+r)^t} + \frac{P_T}{(1+r)^T}$$

- The fundamental value is the present value of the discounted future cash flows from holding the security
- Keys:
  - Forecast future cash flows
  - Apply a sensible discount rate r

Ratios

Profitability measures (review)

- **Return on assets**:
  - income earned per dollar deployed.

$$\text{ROA} = \frac{\text{EBIT}}{\text{Total Assets}}$$

- **Return on capital**:
  - income earned per dollar invested (long term)
    - Long-term capital = total equity + long term debt

$$\text{ROC} = \frac{\text{EBIT}}{\text{Long-Term Capital}}$$

- **Return on equity**:
  - net income realized by shareholders per dollar invested

$$\text{ROE} = \frac{\text{Net income}}{\text{Shareholder's equity}}$$

Calculate for Twitter

EBIT	
Net Income (Loss)	
Total Assets	
Stockholder's Equity	
Long-Term Debt	

#s in thousands

- ROA:
- ROC:
- ROE:

Economic Value Added (review)

- EVA: (ROC – k)*Long-term capital
- k opportunity cost of capital
- This method considers the opportunity cost of capital, calculates the economic value in $ terms

Calculate for Twitter

EBIT	
Net Income (Loss)	
Total Assets	
Stockholder's Equity	
Long-Term Debt	

#s in thousands

- EVA (k=5%):
  - EVA = (ROC – k)*Long-term capital
  - Trend:
    - 2014: -$789M, 2015: -$747M, 2016: -$681M, 2017: -$303M, 2018:

Flow variables and stock variables

- Income statement: *over the period (flow)*
- Balance sheet: *end of period (stock)*

- Alternative way to calculate:
  - Use the average between the end of the year and beginning of the year (i.e., previous 10K) values for the *balance sheet variables*
    - Twitter ROA Example:
      - 2017 Total Assets: $7,412,477
      - ROA Assets =

Twitter Valuation

- Stock price: $41.22/share
  - 2017 arounds this time: $33.73/share
  - 2016 around this time: $16.65/share
  - 2015 around this time: $18.13/share
  - 2014 around this time: $49.75/share
- Market capitalization: $31.86B
  - 2017: $25.35B
  - 2016: $11.75B
  - 2015: $12.93B
  - 2014: $30.18B

- With terrible profitability ratios in 2013-2016,

What Do The Ratios Really Tell Us?

- Be careful interpreting the ratios, especially in isolation
- Backwards looking measures:
  - Past profitability does not guarantee future profitability.
  - Security values are based on **future** profits.
  - Expectations of future payouts determine today's stock value.

- Another example:
  - Tesla <-10% ROE every year
  - Current market cap: $38.10B

Digging Deeper Into ROA and ROE

ROE and ROA

- ROE can differ from ROA because of leverage
  - Remember: Assets = Debt + Equity
- Leverage makes ROE more volatile

$$ROE = (1 - t)[ROA + (ROA - r)\frac{Debt}{Equity}]$$

- t=tax rate, r=interest rate on debt

Leverage and ROE

$$ROE = (1-t)[ROA + (ROA - r)\frac{Debt}{Equity}]$$

- No debt or ROA=r, then ROE=ROA*(1-t)
- If ROA >r, the firm earns more than it pays out to creditors and ROE increases as debt-to-equity increases
- If ROA<r, ROE decreases as debt-to-equity increases

Leverage and ROE

All values in millions

$1,000M in Assets:
all-equity financed

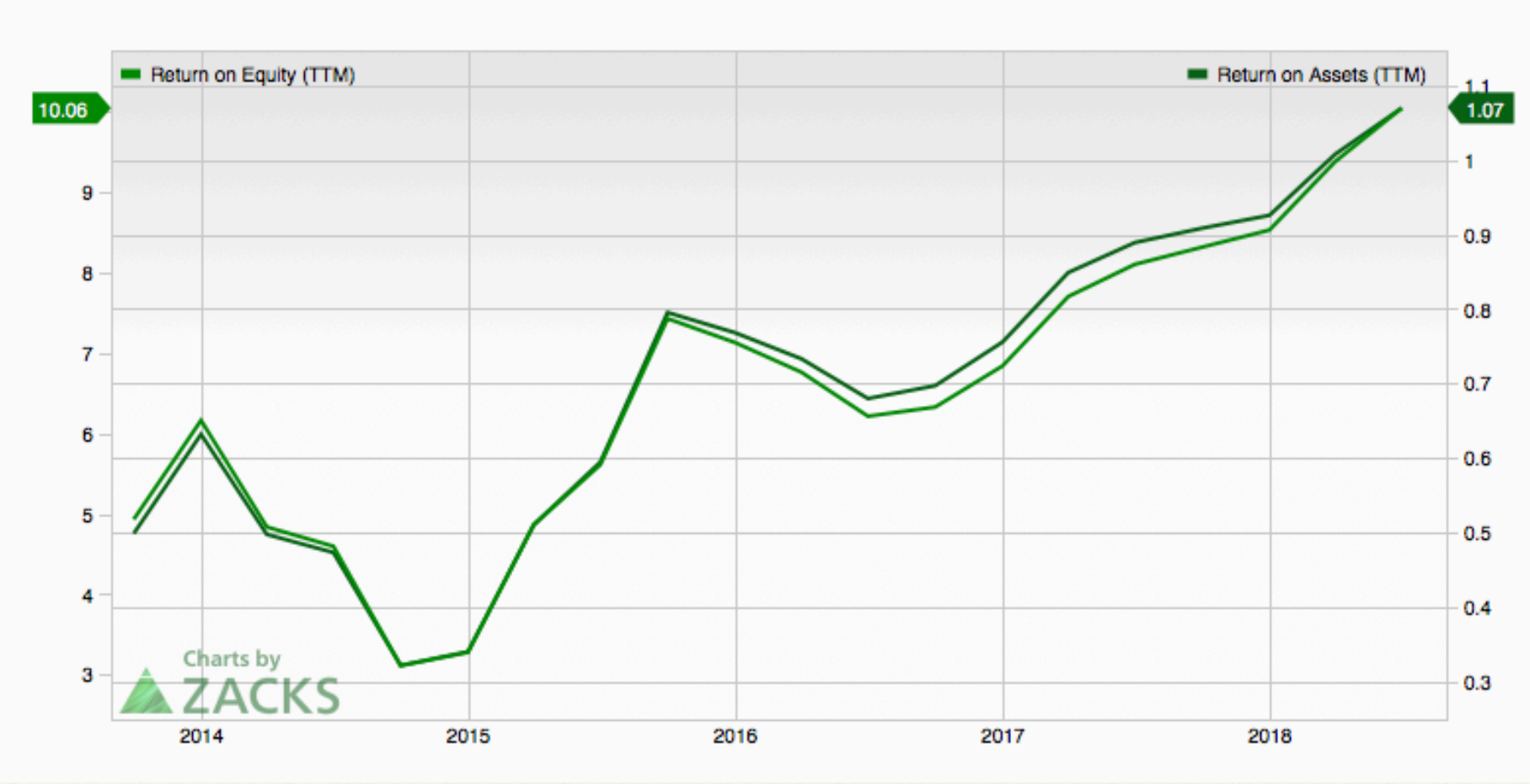
Scenario	Bad Year	Normal Year	Good Year
EBIT	$50	$100	$150
Interest	$0	$0	$0
Taxable Income	$50	$100	$150
Taxes (21%)	$10.50	$21	$31.50
Net Income	$39.50	$79	$118.50
ROE	3.95%	7.9%	11.85%

$1,000M in Assets:
$600M Equity, $400M Debt

Scenario	Bad Year	Normal Year	Good Year
EBIT	$50	$100	$150
Interest (r of 8%)	$32	$32	$32
Taxable Income	$18	$68	$118
Taxes (21%)	$3.78	$14.28	$24.78
Net Income	$14.22	$53.72	$93.22
ROE	2.37%	8.95%	15.54%

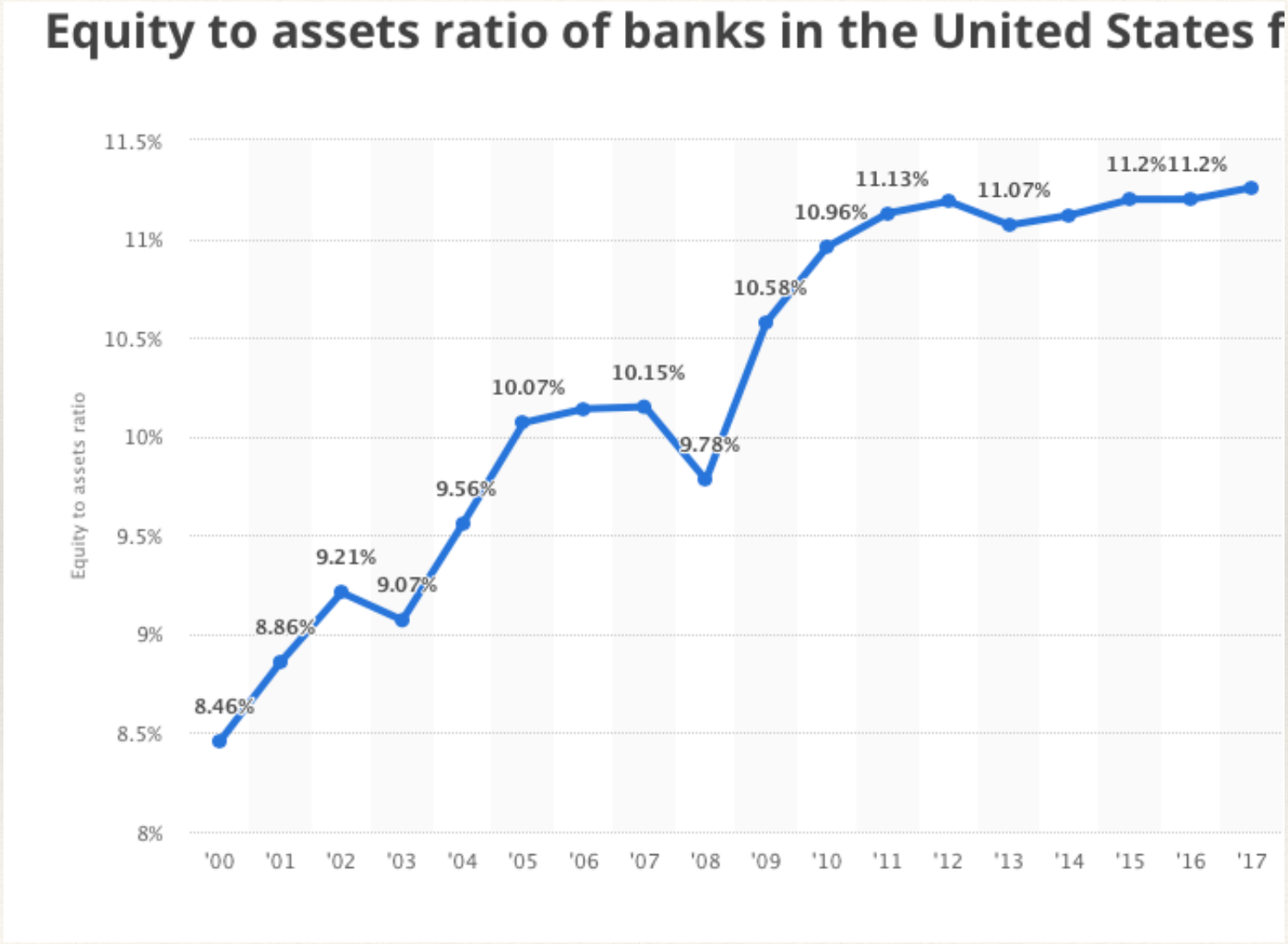
Example: Banks

- Bank of America ROA and ROE:



ROE 10.06%, ROA 1.07%

U.S. Banks are highly levered



~$9 of debt for every $1 of equity

Take away

- Return on equity is affected by capital structure decisions
- Return on assets is not

- If peer firms have significantly different leverage, return on assets is likely a better profitability measure to use for comparison

Decomposition of ROE

Decomposition of ROE (DuPont Method)

- ROE = Net Income / Equity

$$\text{ROE} = \underbrace{\frac{\text{Net income}}{\text{Pre-tax Income}}}_{(1)} \times \underbrace{\frac{\text{Pre-tax Income}}{\text{EBIT}}}_{(2)} \times \underbrace{\frac{\text{EBIT}}{\text{Sales}}}_{(3)} \times \underbrace{\frac{\text{Sales}}{\text{Assets}}}_{(4)} \times \underbrace{\frac{\text{Assets}}{\text{Equity}}}_{(5)}$$

- (1) Tax Burden
- (2) Interest Burden
- (3) Profit Margin
- (4) Total Asset Turnover
- (5) Leverage ratio

Calculate for Twitter

$$\text{ROE} = \frac{\text{Net income}}{\text{Pre-tax Income}} \times \frac{\text{Pre-tax Income}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

- Sales = $3,042,359 (Using "Revenue")
- Pre-tax income =$423,544 ("Income before income taxes")
- For simplicity, use end-of-year instead of the average for stock variables

EBIT	
Net Income (Loss)	
Total Assets	
Stockholder's Equity	
Long-Term Debt	

- Tax Burden:
  - Usually less than 1 (for historically profitable firms)
- Interest Burden:

Another Decomposition

$$\text{ROE} = \underbrace{\frac{\text{Net Profit}}{\text{Pre-tax Profit}}}_{(1)} \times \underbrace{\frac{\text{Pre-tax Profit}}{\text{EBIT}}}_{(2)} \times \underbrace{\frac{\text{EBIT}}{\text{Sales}}}_{(3)} \times \underbrace{\frac{\text{Sales}}{\text{Assets}}}_{(4)} \times \underbrace{\frac{\text{Assets}}{\text{Equity}}}_{(5)}$$

- ROE = Tax Burden x ROA x CLF
  - Tax Burden (1)
  - ROA = Profit Margin (3) x Total Asset Turnover (4)
  - Compound Leverage Factor (CLF)
    = Interest Burden (2) x Leverage Ratio (5)

ROA

- Return on assets can be broken down into profit margin and asset turnover

$$ROA = \frac{EBIT}{Total\ Assets} = \frac{EBIT}{Sales} \times \frac{Sales}{Total\ Assets}$$
$$= Profit\ Margin \times Asset\ Turnover$$

- Usually, profit margin and total asset turnover are negatively related

ROA

- Low profit margin, high turnover:
  - Grocery stores, retailers, Amazon
- High profit margin, low turnover:
  - Jewelers, yachts, Porsche
- Comparing profit margin or turnover in isolation across industries can be misleading

Company	**Profit Margin**	**Asset Turnover**	**ROA**
Kroger	1.54%	3.36	5.17%
Duke Energy	13.23%	.16	2.12%

Ratios

Ratios

- How well is the firm doing right now:
  - Profitability ratios
  - Asset utilization ratios
- What does the future look like (to the market):
  - Growth ratios
- Risks:
  - Liquidity ratios
  - Leverage ratios

Asset Utilization Ratios

$$\text{Total Asset Turnover} = \frac{\text{Sales}}{\text{Average Total Assets}}$$

$$\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Average Fixed Assets}}$$

Fixed assets takes out assets not used for production. Ignores cash, marketable securities, inventories, receivables.

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventories}}$$

$$\text{Days receivables} = \frac{\text{Average Accounts Receivable}}{\text{Annual Sales}} \times 365$$

Number of days worth of sales tied up in accounts receivable. The average lag time between the day of sale and the date payment is received.

Liquidity Ratios

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

Current assets: cash, marketable securities, receivables, inventory, prepaid expenses

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

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

Note: marketable securities includes commercial paper, banker's acceptances, Treasury bills and other money market instruments

Leverage Ratios

$$\text{Interest Burden} = \frac{\text{EBIT - Interest Expense}}{\text{EBIT}} = \frac{\text{Pretax Profit}}{\text{EBIT}}$$

$$\text{Interest Coverage} = \frac{\text{EBIT}}{\text{Interest Expense}}$$

$$\text{Leverage} = \frac{\text{Assets}}{\text{Equity}} = 1 + \frac{\text{Debt}}{\text{Equity}}$$

$$\text{Compound Leverage Factor} = \text{Interest Burden} \times \text{Leverage}$$

Growth vs. Value

$$\text{Market-to-Book} = \frac{\text{Price Per Share}}{\text{Book Value Per Share}}$$

TSLA Market to book is 6.06, Ford's is 1.00

$$\text{Price-Earnings Ratio} = \frac{\text{Price Per Share}}{\text{Earnings Per Share}}$$

TSLA's forward P/E is 63.17, Ford's forward look P/E is 7.17

$$\text{Earnings Yield} = \frac{\text{Earnings Per Share}}{\text{Price Per Share}}$$

Higher book-value to market-value firms have higher returns (Fama and French 1993)
Aggregate P/E ratio can predict long-term market movements

Textual Analysis

- Important sections:
  - Management Discussion and Analysis
  - Risk Factors
  - Legal Proceedings

- Sentiment/tone
  - Higher returns when changes in tone are more positive (Feldman, Govindaraj, Livnat and Segal, 2010)
- Year-to-year changes
  - Substantial text changes predict lower returns (Cohen, Malloy and Nguyen, 2016)

Accounting for Accounting Tricks

Accounting Methods

- Firms have flexibility in the accounting methods they choose

- This creates issues:
  - Comparisons across firms is more difficult than in a world where all firms use the same accounting method
  - Managers have flexibility to choose accounting methods to present results in the best possible light
  - Accounting values may not represent the “true” value

Accounting vs. Economic Earnings

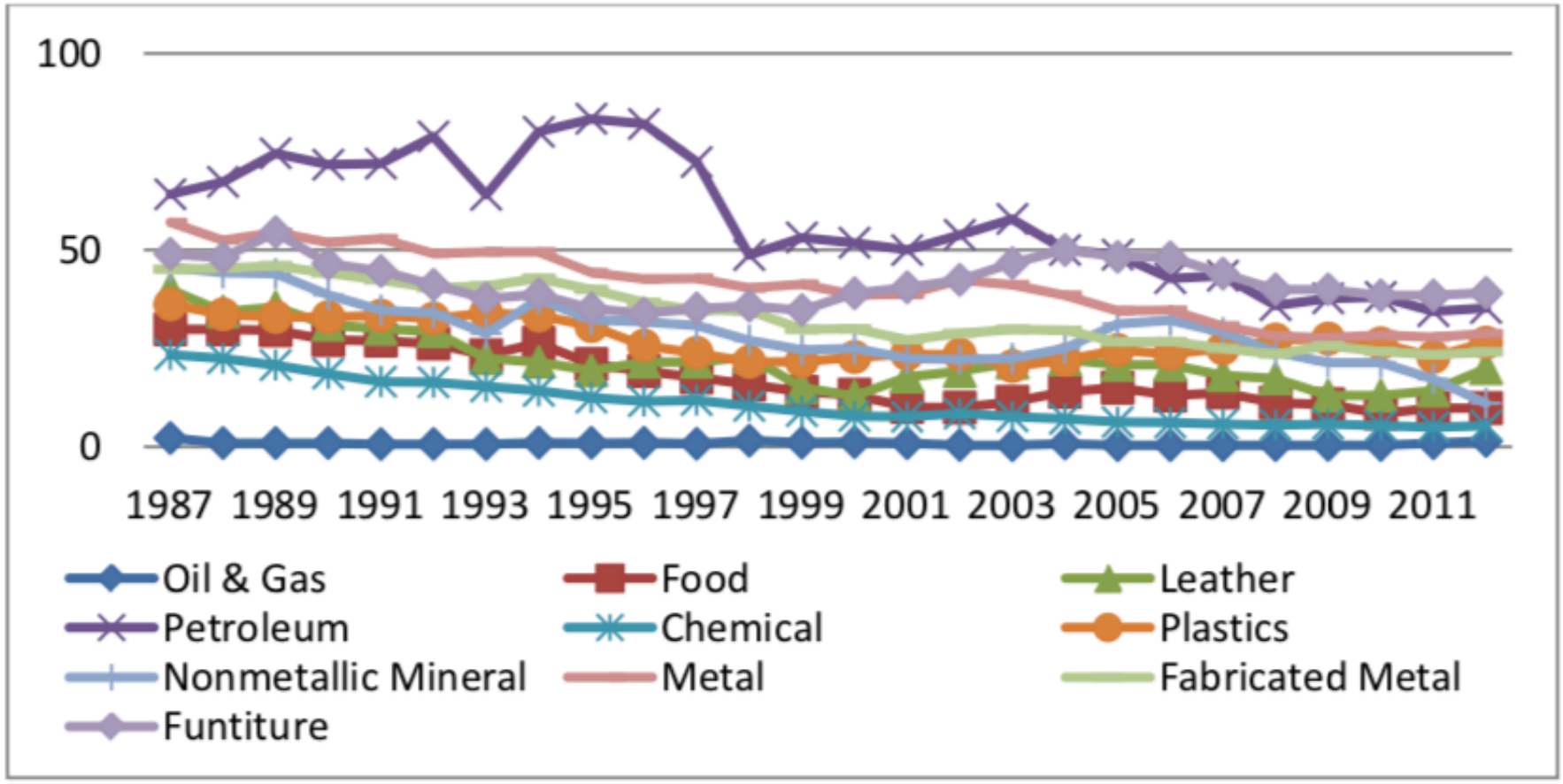
- Economic earnings
  - Sustainable cash flow that can be paid to stockholders without impairing the productive capacity of the firm

- Accounting earnings
  - Affected by conventions regarding the valuation of assets
  - Managers can manipulate earnings

Accounting Issues

- Inventory: LIFO vs. FIFO
  - LIFO: lower COGS, lower earnings, lower inventory on balance sheet (if costs increasing)
- Depreciation
  - Economic vs. Accounting definition
    - In reality, PPE depreciates at a different rate than the rate suggested by the acceptable accounting methods (e.g., straight line)
  - Different depreciation methods for tax and published financial statements.
    - Usually, accelerated and straight-line, respectively
- Inflation

FIGURE 1
THE PERCENTAGE OF FIRMS USING LIFO DURING 1987-2012



Frankel and Hsu (2015)

Accounting Issues

- Historic cost vs. fair value accounting
  - Historic cost may not reflect true value
  - Fair value sometimes requires models, firms can choose the model that gives them the "best" value
- Quality of earnings
  - Ex: too low allowance for bad debt, nonrecurring items, earnings smoothing, revenue recognition (channel stuffing)
  - Example: Freddie Mac decreasing their earnings in 2003
- International differences in accounting standards
  - GAAP vs. IFRS
    - Ex: US allows separate tax and reporting depreciation methods

Summary

- Accounting statements and ratios are informative of the current state of the firm
- Comparing across years and industries give us a better idea of firm performance
- Issues with accounting conventions
- Don’t just rely on past information when purchasing stocks!

Next

- Financial Statement Analysis in-class assignment