ECON 180

Introduction to Principles of Microeconomics and Financial Project Evaluation

Lecture 30: A quick tour of Financial Accounting

November 22, 2022

Version 1

Recommended Reading and Viewing

- Selecting a Business Structure in Canada [Web Page]. (n.d.). Retrieved from https://www.newbusinessnow.com/article/selecting-a-business-structure-in-canada/
  - **Discusses sole proprietorships, partnerships and corporations.**
- Accounting Stuff. (2018, August 15). The Accounting Equation for Beginners. https://youtu.be/56xscQ4viWE
  - **Explains why Assets = Liabilities + Equity**
- Accounting Stuff. (n.d.). The BALANCE SHEET for BEGINNERS (Full Example). https://youtu.be/CMv1zlZhb4Q
- Accounting Stuff. (2021, March 1). The INCOME STATEMENT for BEGINNERS. https://youtu.be/0--AvwZabIQ

Optional Reading and Viewing

- Business in Canada – Do it Right! (2018, October 25). Sole Proprietor, Partnership or Corporation. Start a Business in Canada. https://youtu.be/2KsJZaVE4r8
- *Engineering Economics*, 6th edition, 6.1-6.2
- MYConsulting. (2010, August 15). Corporation vs Sole Proprietorship vs Partnership in Canada. https://youtu.be/BjYMIymiDok
- Setting up your business [Web Page]. (2020, April 22). Retrieved from https://www.canada.ca/en/revenue-agency/services/tax/businesses/small-businesses-self-employed-income/setting-your-business.html
  - **Official government information. Fine to skim this one.**
- The Finance Storyteller. (2019, January 24). Financial ratio analysis. https://youtu.be/MTq7HuvoGck

Optional Viewing on Assets, Liabilities & Equity

- Accounting Stuff. (2019, February 24). What are Assets? (Let's Break Them Down). https://youtu.be/rOsuqG_J0t4
- Accounting Stuff. (2019, March 3). What are Liabilities? (SIMPLE Explanation). https://youtu.be/fKRwT10Sszc
- Accounting Stuff. (2018, March 11). What Does Equity ACTUALLY Mean? https://youtu.be/Fr5oHEYrT2A

Relevant Investopedia (and misc.) Pages

- Understanding the Income Statement: http://www.investopedia.com/articles/04/022504.asp
- EBIT and Interest Income: http://www.investopedia.com/terms/e/ebit.asp
- Minority Interest:
- http://beginnersinvest.about.com/od/incomestatementanalysis/a/minority-interest-cost-equity-consolidated.htm

Relevant Investopedia (and misc.) Pages

- Goodwill: http://www.investopedia.com/terms/g/goodwill.asp
- Intangible Assets: http://www.investopedia.com/terms/i/intangibleasset.asp
- Deferred Long-Term Liabilities:
- http://www.investopedia.com/terms/d/deferredliabilitycharges.asp
- Common Stock: http://www.investopedia.com/terms/c/commonstock.asp
- Retained Earnings: http://www.investopedia.com/terms/r/retainedearnings.asp
- Capital Surplus: http://www.investopedia.com/terms/c/capitalsurplus.asp
- Net Tangible Assets: http://www.investopedia.com/terms/n/nettangibleassets.asp
- Comprehensive Income: http://www.investopedia.com/terms/a/accumulatedother.asp

Sources for JEC data

- JEC Income Statement: https://www.nasdaq.com/symbol/jec/financials?query=income-statement (Accessed June 17, 2018)
- JEC Balance Sheet: https://www.nasdaq.com/symbol/jec/financials?query=balance-sheet (Accessed June 17, 2018)
- JEC Balance Sheet: https://finance.yahoo.com/quote/JEC/balance-sheet?p=JEC (Accessed June 17, 2018)
- CSIMarket: JEC's Efficiency versus its Competition (Ratio): http://csimarket.com/stocks/competitionNO5.php?code=JEC (Accessed June 17, 2018)
- CSIMarket: JEC's Management Effectiveness versus its Competition (Ratio): http://csimarket.com/stocks/competitionNO6.php?code=JEC (Accessed June 17, 2018)

Learning Objectives

- Understand common firm ownership structures (sole proprietorships, partnerships, corporations) and their implications for liability.
- Gain a basic familiarity with common financial statements such as the balance sheet and income statement. (Enough to ‘unscramble’ a list of the relevant entries, or fill in missing values/labels, as in some end-of-chapter problems.)
- Understand the difference between current and long-term assets and liabilities, and the relationship between equity, assets and liabilities.
- Gain familiarity with common financial ratios and be able to both calculate them and interpret them to gauge a firm's health relative to its peers.

Relevant Solved Problems

- Income Statement and Balance Sheet: Example 6.1, Example 6.2, Example 6.3, Review Problem 6.1, 6.4, 6.6.a, 6.8, 6.14, 6.15

- Financial Ratios: Review Problem 6.2, 6.6.b, 6.7, 6.9, 6.11, 6.12, 6.13, 6.16

Notation Dictionary

(Not provided on quiz/final formula sheet)

- EBIT = Earnings Before Interest and Taxes (despite the name, includes interest income!)
- JEC = Jacobs Engineering Group, source of our data.
- RoA = Return on Assets. The same as Return on Investment.
- RoE = Return on Equity; reported as a %
- RoI = Return on Investment. Another name for Return on Assets.

$f(x)$

Equations: Part 1

- Notation: The orange symbol on a slide indicates a formula sheet formula is introduced there.

- Current (Working Capital) Ratio: $\frac{\text{Current Assets}}{\text{Current Liabilities}}$
- Quick (Acid-Test) Ratio: $\frac{\text{Quick Assets}}{\text{Current Liabilities}}$
- Equity Ratio: $\frac{\text{Total Equity}}{\text{Total Assets}}$
- Return on Assets / Investment: $\frac{\text{Net Income}}{\text{Total Assets}}$
- Return on Equity: $\frac{\text{Net Income}}{\text{Total Equity}}$

Equations: Part 2

$f(x)$

- Notation: The orange symbol on a slide indicates a formula sheet formula is introduced there.
- Debt/Equity Ratio = $\frac{\text{Total Liabilities}}{\text{Total Equity}}$
- Asset Turnover Ratio = $\frac{\text{Sales or Revenues}}{\text{Total Assets}}$
- Net Tangible Assets (Book Value) = Total Assets - Intangible Assets – Liabilities
- Accounting Identity: Assets = Liabilities + Equity

ESSENTIALS (15 slides)

Road Map

- Basics of Assets, Liabilities and Equity
- Types of firm
- The Income Statement
- The Balance Sheet
- After Hours: Some solved problems
- After Hours: Financial Ratios and their interpretation

Financial accounting

- A method for organizing & recording financial data.
- We're now entering the vocab-building portion of this lecture.
- I'll be throwing a lot of terms at you, and it's important to become familiar with them.
- To help them seem relevant, we'll be looking at the actual relevant numbers for one of the world's leading engineering firms, Jacobs Engineering (or JEC on the stock market).

JACOBS Engineering Group

Assets, Liabilities and Equity

$f(x)$

- Summarize a firm's financial position at a given point in time.
- Assets: Resources owned by the firm
- Liabilities: Debt
- Equity: what's due to the owners of the firm
- → **Assets = Liabilities + Equity** ← By definition, always true
- This is the basis of double-entry book-keeping, and why the 'balance sheet' (later in the lecture) balances.
- Intuition: An asset is either paid for by the owners, or by borrowing.

What if a firm is bankrupt?

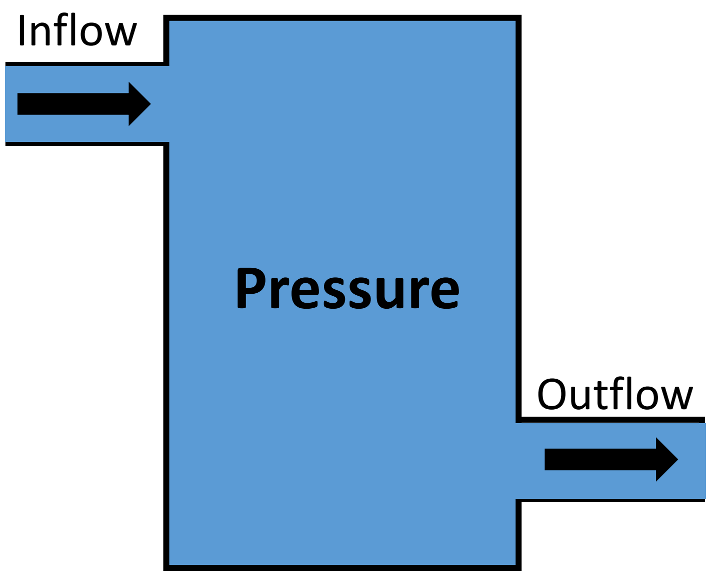
- If a firm is bankrupt, it is *still* true that Assets = Liabilities + Equity
- A bankrupt firm has more debts than assets: Liabilities > Assets.
- This means that its Equity is *negative*. It must be, in order to satisfy the accounting identity.
- So, a firm could have $1,000,000 in assets, $1,500,000 in Liabilities, and -$500,000 in Equity.
- It is possible for a firm to have negative equity for a while and *not* be bankrupt (partly since many of those liabilities may not come due for years), but it’s still a bit ‘red flag’ to potential investors that they should probably stay away from that firm.
- For more on negative equity, see https://www.investopedia.com/ask/answers/08/negative-shareholder-equity.asp

Firm?

- Sole proprietorship: one owner, who is personally responsible for *all* of the firm's debts. This *unlimited liability* is VERY risky for the owner.
- General partnership: multiple owners who collectively have unlimited liability for the firm's debts. What share is due to each is governed by a contract.
- Limited partnership: some owners are involved only as investors, and have *limited liability*: they're only responsible for firm debts up to the value of their investment in the firm.
- Corporation: owned by shareholders, all of whom have limited liability. No one has unlimited liability.
- Shareholders own stock, which represents shares of ownership in the company.

The income statement and balance sheet

- From your textbook, an apt analogy.
- Think of a firm as a tank filled with water, with an inflow and an outflow.
- The flows (in/out) are described by the income statement.
- The pressure (through/state) variable is described bye balance sheet.
- We'll look first at the income statement.
- At its most basic, the income statement lists Revenues, Expenses, and Net Income (Revenue – Expenses).



Income Statement

- Summarizes revenues and expenses in a given accounting period.
- This might *sound* like what you did when drawing cash flow diagrams, but that's closer to a statement of changes in financial position, or *cash flow statement*.
- Important line item: EBIT (Earnings Before Interest and Taxes): measures operating profit, and is often used to judge whether a firm is profitable enough to make back the cost of its capital.

Jacobs Engineering Group (JEC)

Income Statement, Year Ending September 29, 2017

	$ thousands
Total Revenue	**10,022,788**
Cost of Revenue	8,250,536
Gross Margin (or Gross Profit)	**1,772,252**
Research & Development	0
Selling, General and Administrative	1,379,983
Total Operating Costs (plus cost of Revenue)	9,630,519
Operating Income or Loss	**392,269**
Additional Income	12,983
Earnings Before Interest and Taxes (EBIT)	**405,252**
Interest Expense	12,035
Earnings Before Tax	**393,217**
Income Tax	105,842
Minority Interest	6,352
Net Income from Continuing Operations	**293,727**
Non-Recurring (Extraordinary) Events	0
Net Income	**293,727**

Revenue: Sales or income from services rendered

Cost of Revenue: Cost of producing the goods or services sold. Includes depreciation.

Gross Margin: Revenue – Cost of Revenue

Operating Expenses: Costs of running the business. Includes R & D and Cost of Revenue

Operating Income: Gross Margin – Operating Costs

EBIT: Includes interest income (not expenses)

Income before taxes: EBIT – Interest Expense

Minority Interest: Gains or losses from minority (<50%) ownership of other firms.

Net Income from Continuing Operations: Income before taxes – Minority Interest – Taxes

Net Income: Also includes one-time events. This is the literal and figurative '**bottom line**'.

The Balance Sheet

- So called because it balances: **Assets = Liabilities + Equity**
- This is the source of double-entry book-keeping.
- If there is an increase/decrease on the left-hand-side, there must be an increase/decrease on the right-hand side.
- Assets and Liabilities (Debt) are divided into *current* (due in less than a year) and *long-term* (due in more than a year) forms.
- Owner's Equity can be divided into the value of stock (shares of ownership) and retained earnings.
- Retained earnings are profit the firm earned that were used to buy assets or pay down debt, instead of being handed over to the owners.
- The balance sheet is complicated, so we'll look at a reduced form first, then zoom in to each category.

Jacobs Engineering Group (JEC)

Based on Balance Sheet, Year Ending September 29, 2017

Assets		**7,380,859**
Current Assets	2,996,180	
Long-Term Assets	4,384,679	
Liabilities		**2,952,507**
Current Liabilities	1,926,227	
Long-Term Liabilities	1,026,280	
Owners' Equity		**4,428,352**
Common Stock	120,386	
Capital Surplus	1,239,782	
Retained Earnings	3,721,698	
Other Equity	(653,514)	

2,952,507	Liabilities
4,428,352	Equity
7,380,859	Assets

Assets

- Resources owned by the firm.
- Divided by *liquidity* into current and long-term (or ‘fixed’) assets.
- Liquidity: how easy it is to turn something from one form into another (liquids take the shape of the container they’re poured into).

- Quick Assets: extremely liquid – almost as good as cash. Include accounts receivable, cash and cash equivalents and some short-term investments.
- Current assets: very liquid - can be turned into cash in a year or less. e.g. inventory, many government bonds, Pokemon cards.
- Long-term assets: refers to both illiquid assets that would take more than a year to turn into cash (e.g. custom equipment), or assets that can’t be liquidated while the firm remains in operation (e.g. headquarters)

Jacobs Engineering Group (JEC)

Balance Sheet, Year Ending September 29, 2017

	$ thousands
Assets	
Current Assets	
Cash and Cash Equivalents	774,151
Short-Term Investments	0
Accounts receivable	2,102,543
Inventory (at cost)	0
Other Current Assets	3,035
Total Current Assets	**2,996,180**
Long-Term Assets	
Long Term Investments	145,069
Property, Plant and Equipment Net of Depreciation	349,911
Goodwill	3,009,826
Other Intangible Assets	332,920
Other Long-Term Assets	546,953
Total Long Term Assets	**4,384,679**
Total Assets	**7,380,859**

Accounts Receivable: Sales for which payment has not yet been collected ('the cheque's in the mail')

Inventory: Evaluated at cost (not expected sale price). Not applicable to Jacobs, which sells services.

Depreciation: Jacobs only reported the value net of depreciation. Often, depreciation is its own line item (as in the textbook).

Intangible Asset: Assets without an important physical component. Goodwill, trademarks, copyrights, patents, other intellectual property, etc.

Goodwill: A type of intangible asset. Brand name, customer base, customer and employee relations, etc. When acquiring a company, often assumed to be the difference between the price paid for the company and its book value.

Liabilities

- Claims by non-owners on the firm's assets.
- Everything the firm owes.

- Current liabilities: due within a year or less. Draw on current assets.
- Long-term liabilities: due in more than a year, and/or not expected to draw on current assets.

Jacobs Engineering Group (JEC)

Balance Sheet, Year Ending September 29, 2017

	$ thousands
Liabilities	
Current Liabilities	
Accounts Payable	683,605
Short/Current Long Term Debt	238,071
Other Current Liabilities	378,637
Total Current Liabilities	**1,926,227**
Long-Term Liabilities	
Long Term Debt	235,000
Other Liabilities	732,281
Minority Interest	58,999
Total Long-Term Liabilities	**1,026,280**
Total Liabilities	**2,952,507**

Accounts Payable: Expenses that have been incurred but not yet paid (the flip side of accounts receivable).

Current Long Term Debt: Long-term debt payments that are due within the next year.

Minority Interest: Expenses due to minority ownership of a company's subsidiaries by others.

Equity

- What is due to the owners of a firm
- Assets – Liabilities = Owner’s Equity
- These three categories *must* balance: hence balance sheet.
- Owner’s Equity = Common Stock + Capital Surplus + Retained Earnings + Other
- Common Stock: shares valued at ‘par’, or face value at issue.
- Capital Surplus: roughly, amount earned on share issue, over the par value.
- Retained earnings: reinvested in the company (debt payment, etc.)
- Other? Often includes comprehensive income: ‘incoming income/losses’ that can’t be included on the income statement because they’re unrealized as of now.
- Suppose there’s a profit (or earning): it can be invested in new assets (+assets), used to pay off debts (-liabilities) or paid as dividends to shareholders (+equity).

$f(x)$

Jacobs Engineering Group (JEC)

Balance Sheet, Year Ending September 29, 2017

	$ thousands
Owners' Equity	
Common Stock (at par)	120,386
Retained Earnings	3,721,698
Capital Surplus	1,239,782
Other Equity	(653,514)
Total Owners' Equity	**4,428,352**
Net Tangible Assets (Book Value)	**1,085,606**

Common Stock: Shares of ownership in a company. By convention, evaluated at par (face value at issue).

Retained Earnings: Net Income not paid to owners, kept by the company to reinvest in assets or to pay debt.

Capital Surplus: Amount raised from stock in excess of par (face) value.

Other Equity: From Yahoo Financials, we see that in this case, this was equal to *Treasury Stock*: stock bought back by the company to reduce traded stock.

Not part of Equity, but put here for convenience…

Net Tangible Assets = Total Assets - Intangible Assets - Liabilities - Par Value of Preferred Stock

Also called '**Book Value**'. Preferred Stock pays a dividend, but does not usually carry voting rights. JEC has no preferred stock on its balance sheet. **(For the purpose of this course, you may ignore preferred stock.)**

AFTER HOURS

- Some solved problems (4 slides)
- Financial Ratios (9 slides)

Some solved problems

- Q: A firm buys a truck for $25,000 and pays for it in cash. What happens to the firm's assets, liabilities and equity?
- A: No change in liabilities or equity. Lost assets of $25,000 cash, gained assets of $25,000 truck → Net $0 change.
- Q: The owner of a convenience store eats one of the store's bags of chips for her lunch, without paying for it. The bag of chips cost the store $0.50. What happens to the store's assets, liabilities and equity?
- A: No change in liabilities. Lost chips worth $0.50 → -$0.50 in Assets. Drop of -$0.50 in Owner's Equity.
- Q: The owner of a convenience store buys a case of potato chips for the store, on credit. The case of chips cost $100. What happens to the firm's assets, liabilities and equity?
- A: Gained $100 of chips → Assets went up by $100. Extra $100 of credit debt → Liabilities went up by $100. No change in equity.

A few more…

- Q: A firm returns defective computer equipment worth $1,000 to the manufacturer. The manufacturer pays for shipping and gives them a $1,000 cash refund. What happens to the firm's assets, liabilities and equity?
- A: No change in liabilities or equity. Assets: Lost $1,000 of computer equipment, gained $1,000 in cash → Net change = $0.
- Q: An engineering firm buys a crane for $75,000. It borrows $25,000, and pays for the other $50,000 out of its profits. What happens to the store's assets, liabilities and equity?
- A: Assets: +$75,000 Crane. Liabilities: +$25,000 debt. Equity: +$50,000 retained earnings.
- Q: A catering company sends a bill for $1,250 to its most recent client. What happens to its assets, liabilities and equity?
- A: No change in liabilities. Assets: +$1,250 Accounts Receivable. Equity: +$1,250 (since none of the accounts receivable is due creditors).

One last question: Assets = Liabilities + Equity

- Crystal Lake Entertainment, a corporation, recently bought a hockey mask manufacturer for $1 million. It paid $250,000 in cash, and borrowed the remainder of the money ($750,000) from the company founder's mother. (Hint: No additional information is needed – it's easy to over-think this!)

a. Did this purchase change the corporation's **equity**? If so, by how much?

b. Did this purchase change the corporation's **liabilities**? If so, by how much?

c. Did this purchase change the corporation's **assets**? If so, by how much?

Answering the question

a. Equity: No change. Nothing happened to equity.
b. Liabilities: The company borrowed \$750,000. This is a new debt, so liabilities went up by \$750,000. There was no other change to liabilities.
c. Assets: We know that Assets = Liabilities + Equity. Equity did not change, and liabilities went up by \$750,000, so Assets MUST have gone up by \$750,000, as well. The company's assets went up by the \$1,000,000 worth of new firm, but fell by \$250,000, since that's how much it paid out in cash.

Financial ratios

- Fractional indices used to quickly and simply gauge a firm's health and performance.
- We'll look at some of the most common:
- Current (Or Working Capital) ratio, Quick ratio, Equity Ratio, Debt/Equity Ratio, Inventory Turnover Ratio, Receivables Turnover Ratio, Asset Turnover Ratio, Return on Assets/Equity, Return on Investment.
- Caution: most of these only make sense when comparing numbers within the same industry…
- …and it's not often clear what industry a firm fits into.
- (Not a problem with our engineering/construction firm.)

Current (Working Capital) ratio

$f(x)$

- Measures ability to meet current obligations. Higher is generally better.
- *Caution: Assumes ability/willingness to liquidate current assets.*

$$\text{Working capital ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

- JEC: 1.56 > Industry Average: 1.42

Current (or Working Capital) Ratio		**Average**
Current Assets	2,996,180	
Current Liabilities	1,926,227	
Current Ratio	**1.56**	**1.42**

Acid-test or 'Quick' ratio

$f(x)$

- Ratio of 'quick' assets to current liabilities. Higher is generally safer.
- Quick asset: the most liquid of assets, that can be turned into cash almost immediately. E.g. cash, accounts receivable, marketable securities.

$$\text{Quick ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

- JEC: 1.49 > Industry Average: 0.26

Acid-Test or Quick Ratio		**Average**
Cash and Cash Equivalents	774,151	
Accounts Receivable	2,102,543	
Quick Assets	**2,876,694**	
Current Liabilities	1,926,227	
Quick (Acid-Test) Ratio	**1.49**	**0.26**

Equity Ratio

$f(x)$

- A basic measure of risk.
- A smaller ratio means a higher dependence on debt financing, and therefore higher risk (since debt must be paid, and paid first)

$$\text{Equity ratio} = \frac{\text{Total Owner Equity}}{\text{Liabilities} + \text{Owner Equity}} = \frac{\text{Total Equity}}{\text{Total Assets}}$$

- Instead of an equity ratio, Jacobs reports the related and more common Debt/Equity ratio, usually calculated as Liabilities/Equity (some reports include only long-term liabilities).

Debt/Equity Ratio and Equity Ratio

Total Liability	2,952,507
Total Equity	4,428,352
Total Assets	7,380,859
Debt / Equity Ratio	**0.67**
Equity Ratio	**0.60**

Inventory Turnover Ratio

- Measures how efficiently a firm is managing its inventories.
- Higher is generally better.

- $\text{Inventory Turnover Ratio} = \dfrac{\text{Sales}}{\text{Inventories}}$

- Being an engineering and construction firm, this ratio is not well defined for Jacobs.
- Instead, it reports two more general ratios: the Receivables Turnover Ratio and the Asset Turnover Ratio.

Asset Turnover Ratio

$f(x)$

- Measures the efficiency with which a firm uses its assets in the pursuit of revenue.
- Higher is generally better.

$$\text{Asset Turnover Ratio} = \frac{\text{Sales or Revenues}}{\text{Total Assets}}$$

- JEC: 1.36 > Industry Average: 0.49

Asset Turnover Ratio		**Average**
Sales or Revenue	10,022,788	
Total Assets	7,380,859	
Asset Turnover Ratio	**1.36**	**0.49**

$f(x)$

Return on Assets/Return on Equity

- Basic measures of profitability.
- Return on Assets is also called 'Return on Investment', or 'RoI'.
- Measures 'bang for your buck', 'your' referring to the firm's assets or owner capital embodied in equity.

$$\text{Return on assets [equity]} = \frac{\text{Net income before extraordinary items}}{\text{Total assets [equity]}}$$

- Unusual items (called extraordinary items in the text) are those that aren't part of normal businesses activities and are not recurring factors. A sale of a division, a merger or a natural disaster are all examples of unusual items.
- **In common practice, interest expenses are added to net income when calculating the RoA.**
- **(For this course, follow the textbook and formula above.)**
- For more info on the above, see http://www.investopedia.com/terms/r/returnonassets.asp

Return on Equity (RoE)

Net Income from Continuing Operations	293,727
Total Owners' Equity	4,428,352
Return on Equity (RoE) Ratio	**6.63%**

Return on Assets/Investment (as in textbook)

Net Income from Continuing Operations	293,727
Total Assets	7,380,859
Return on Assets/Investment (RoA/RoI)	**3.98%**

Return on Assets/Investment (common usage)

Net Income from Continuing Operations	293,727
Interest Expense	12,035
Total Assets	7,380,859
Return on Assets/Investment (RoA/RoI)	**4.14%**

A few things to worry about when using financial ratios…

- Variation in accounting measures from firm to firm
- Approximations (often based on internal models, unknown simplifying assumptions)
- Seasonality
- Need to compare values to those of the correct other companies: not always clear-cut. (e.g. Apple vs… ?)