15.516x Financial Accounting
Financial Statement Analysis

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Motivation: Financial Statement Analysis / Ratio Analysis

- Has many different uses:

  - Evaluate managers and determine compensation

  - Compare firms of different sizes

  - Generate "quick" measures of firm health/performance

  - Valuation analysis such as that involved in making acquisitions

  - Basis of "trading rules" (e.g., accrual anomaly, book-to-market anomaly)

Example: Comparing Amazon and Walmart

Both companies engage in retail sales but historically take different strategies:

- Amazon began online; is moving into physical stores.
- Walmart began in physical stores; is moving into online.

Amazon has a lower return on equity (ROE) than Walmart.

In this class we will explore why.

Note for our discussion today:

ROE = Net income/Ending Stockholders' Equity

Balance Sheet - Assets (in millions)

	Walmart 2016	Amazon 2016
Assets:		
Cash	8,705	19,334
Receivables	5,694	8,576
Less: Allowance	(70)	(237)
Inventory	44,469	11,461
Other Current Assets	1,441	6,647
Total Current Assets	**60,239**	**45,781**
Property, Plant, & Equipment	176,958	37,230
Less: Accum Dep.	(66,787)	(8,116)
Goodwill	16,695	3,784
Other Assets	12,476	4,723
Total Assets	**199,581**	**83,402**

Balance Sheets - Common Size (% of total assets)

	Walmart 2016		Amazon 2016	
Assets:	$	%	$	%
Cash	8,705	4%	19,334	23%
Receivables	5,694	3%	8,576	10%
Less: Allowance	(70)	0%	(237)	0%
Inventory	44,469	22%	11,461	14%
Other Current Assets	1,441	1%	6,647	8%
Total Current Assets	60,239	30%	45,781	55%
Property, Plant, & Equipment	176,958	89%	37,230	45%
Less: Accum Dep.	(66,787)	-33%	(8,116)	-10%
Goodwill	16,695	8%	3,784	5%
Other Assets	12,476	6%	4,723	6%
Total Assets	199,581	100%	83,402	100%

Does inventory accounting affect comparison?

Recall that LIFO/FIFO can lead to big differences in income and assets.

Want to make sure that Amazon and Walmart are comparable.

How to get information?

Search annual report/10-K on "inventories"

Amazon on FIFO

Walmart – mixture, but approximately same as FIFO. Parts of Walmart footnote:

- Walmart uses LIFO method for U.S. inventories.
- Walmart uses FIFO method for international inventories.
- At January 31, 2016 and 2015, our inventories valued at LIFO approximated those inventories as if they were valued at FIFO.

Balance Sheets – Liabilities & SE Common Size (% of total assets)

Liabilities and Stockholder's Equity	Walmart 2016 $	%	Amazon 2016 $	%
Accounts Payable	38,487	19%	25,309	30%
Accrued Liabilities	19,607	10%	13,739	16%
Unearned Revenue	-	-	4,768	6%
Other Current Liabilities	6,525	3%	-	-
Total Current Liabilities	64,619	32%	43,816	53%
Long term Debt	38,214	19%	7,694	9%
Other long term Liabilities	13,137	7%	12,607	15%
Stockholders' Equity:				
Contributed Capital	2,122	1%	17,191	21%
Other	(8,532)	-4%	(2,822)	-3%
Retained Earnings	90,021	45%	4,916	6%
Total Stockholder's Equity	83,611	42%	19,285	23%
Total Liabilities & Stockholders' Equity	199,581	100%	83,402	100%

Ratio Analysis: Agenda

We will consider some basic ratios
- Why are they calculated?
- Who would be interested?
- How would these ratios be affected by various management actions?

Liquidity / Solvency Ratios: Ability to pay bills

Profitability Ratios: Ability to generate profits

Efficiency Ratios: Ability to efficiently manage operations

Note on Ratio Analysis

- On the final, we will give definitions of applicable ratios.

- Will use to test understanding of material (as in the LIFO/FIFO example later).

Testing Your Understanding Liquidity/Solvency (Amazon)

Short-term Liquidity Measures

Working Capital = Current Assets - Current Liabilities

$$= 45,781 - 43,816$$

$$= 1,965$$

Current ratio = Current Assets / Current Liabilities

$$= 1.04$$

If Amazon paid off all its accounts payable with cash, how would that affect:

- its working capital?
  - *it would remain the same*

- its current ratio?
  - *it would increase*

Reference: Changes in Ratios

Ratio Value (Example)	Add to numerator and denominator (Example)	New Ratio vs. Old Ratio (Example)
Greater than 1 (e.g. 2/1 > 1)	Positive (e.g. +1)	Smaller (e.g. 3/2 < 2/1)
Greater than 1 (e.g. 2/1 > 1)	Negative (e.g. –0.5)	Bigger (e.g. 1.5/0.5 > 2/1)
Less than 1 (e.g. 1/2 < 1)	Positive (e.g. +1)	Bigger (e.g. 2/3 > 1/2)
Less than 1 (e.g. 1/2 < 1)	Negative (e.g. –1)	Smaller (e.g. 0/1 < 1/2)

Example:
Effect of paying off A/P if current ratio is 1.04

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Less than 1 (e.g. 1/2 < 1)	Negative (e.g. –1)	Smaller (e.g. 0/1 < 1/2)

Liquidity / Solvency Ratios (Balance Sheet Ratios)

Long-term / Overall Financial Risk Measures

Debt-Equity Ratio:

Total Liabilities / Total Stockholders' Equity

Associated with bankruptcy risk, but also higher rate of return to equity holders

Also sometimes computed as (Long term debt + Short term debt) / Stockholders' Equity

Alternative: Leverage Ratio:

Total Assets / Total Stockholders' Equity

A/E = (L+E)/E = (1+L/E)
Leverage = 1 plus debt to equity

Liquidity / Solvency Ratios (Other Ratios)

Times interest earned =

Earnings before interest expense and taxes / interest expense

Altman's (1968) Z-score for bankruptcy prediction (**not on exam****)**

$$\text{Z-score} = 1.2 \times \frac{\text{Working capital}}{\text{Total assets}} + 1.4 \times \frac{\text{Retained earnings}}{\text{Total assets}} + 3.3 \times \frac{\text{EBIT}}{\text{Total assets}} + 0.6 \times \frac{\text{Market value of equity}}{\text{Total liabilities}} + 0.99 \times \frac{\text{Sales}}{\text{Total assets}}$$

Combines five liquidity / solvency / profitability / efficiency ratios into a "score."

Z < 1.23 indicates high probability of bankruptcy.

Testing Your Understanding

Walmart Debt-Equity ratio   **=** Total Liabilities / Total S/E

= 115,970 / 83,611 = 1.39

Amazon Debt-Equity ratio   **=** Total Liabilities / Total S/E

= 64,117 / 19,285 = 3.32

Walmart Leverage ratio   **=** Total Assets / Total S/E

= 199,581 / 83,611 = 2.39

Amazon Leverage ratio   **=** Total Assets / Total S/E

= 83,402 / 19,285 = 4.32

Testing Your Understanding

Amazon Debt-Equity Ratio = Total Liabilities / Total Stockholders' Equity

$$= 64{,}117 / 19{,}285 = 3.32$$

Would the Debt-Equity Ratio increase, decrease or remain unchanged with each of these actions in 2016?

Amazon pays more dividends in 2016

D/E would increase

Amazon records more bad debt expense in 2016

D/E would increase

Amazon pays off all its accounts payable with cash in 2016

D/E would decrease

Amazon issues $1 billion of long-term debt and $1 billion of stock in 2016

D/E would decrease

Income Statements - Common Size (% of sales)

	Walmart 2016		Amazon 2016	
	$	%	$	%
Total Revenue	482,130	100%	135,987	100%
Cost of Sales	360,984	75%	88,265	65%
Selling General & Admin	87,587	18%	43,369	32%
Interest Expense	2,467	1%	384	0%
Other expenses	9,454	2%	167	0%
Operating Expenses	460,492	96%	131,801	97%
Other income	-	0%	90	0%
Income before taxes	21,638	4%	3,892	3%
Income Tax expense	6,558	1%	1,425	1%
Minority Interest	386	0%	96	0%
Net Income	14,694	3%	2,371	2%

Profitability Ratios (Income Statement Ratios)

Margins

Net margin percentage: The ratio of net profits to revenues

(Often simply called profit margin)

Other margins

Gross margin percentage: The ratio of gross profits to revenues

Operating margin percentage: The ratio of operating profits to revenues

Profitability Ratios: Income Statement

Margins

Amazon Net Margin percentage: Net income/revenues

$$2{,}371 \ / \ 135{,}987 \ = \ 1.74 \ \%$$

Walmart Net Margin percentage: Net income/revenues

$$14{,}694 \ / \ 482{,}130 \ = \ 3.04 \ \%$$

Return on Investment
(Income as a % of Investment)

Return to all investors

 Return on Assets (ROA) = Income / Total Assets

Which Income?
- We will focus on Net Income
- Others: Earnings without Interest Expense, EBITDA, etc.

Return to stockholders

Return on equity (ROE) = Net Income / Stockholders' Equity

Which Investment Level?
- We will focus on Ending Stockholders' Equity (more data available)
- Why is Average Stockholders' Equity better?

Profitability Ratios

Assume we scale by ending assets or ending equity:

Walmart ROA =   Net Income / Ending Total Assets

14,694 / 199,581 = 7.4%

Amazon ROA =   Net Income / Ending Total Assets

2,371 / 83,402   = 2.8%

Walmart ROE =   Net Income / Ending Total SE

14,694 / 80,546   = 18.2%

Amazon ROE =   Net Income / Ending Total SE

2,371 / 19,285 = 12.3%

Testing Your Understanding
Profitability Ratios

Amazon ROE = Net Income / Ending Total SE

= 2,371 / 19,285 = 12.3%

In 2016, how would Amazon's ROE change if:

- On 12/31/2016, Amazon issued stock for cash
  - *ROE would decrease*
- On 12/31/2016, Amazon pays a cash dividend
  - *ROE would increase*
- On 12/31/2016, all of Amazon's customers paid off their receivables
  - *ROE is unaffected*
- On 12/31/2016, Amazon realizes that it has an error. It completely neglected to make the entries for an additional $100,000 in accrued compensation.
  - *ROE would decrease*
- On 12/31/2016, Amazon increases its expense on estimated returns.
  - *ROE would decrease*

Efficiency Ratios

Operating Efficiency

Asset Turnover   =   Revenue / Total Assets

(How fast are you generating revenue from your assets?)

A/R Turnover   =   Revenue / Net Accounts Receivable

(Measures how quickly you collect cash on your credit sales. If company has lots of credit revenue, but very low receivables, implies you collect cash on your credit revenues quickly)

Inventory Turnover =   Cost of Goods Sold / Inventory

(How quickly do you sell your inventory? If company has lots of COGS, but very low inventory, implies turn your inventory around pretty quickly)

Review / Testing Your Understanding

Assume that Amazon uses the definition

Inventory Turnover = COGS / Ending Inventory

= 88,265 / 11,461 = 7.70

Amazon uses FIFO. Under "normal circumstances," would inventory turnover be higher or lower under LIFO?

Effect on COGS:

Increase

Effect on Ending Inventory:

Decrease

Effect on Inventory Turnover:

Increase

What are "normal circumstances"?

- Rising prices
- No reduction in inventory

Efficiency Ratios

	Amazon:	Walmart:

Asset turnover:
$$\frac{135{,}987}{83{,}402} = 1.63 \qquad \frac{482{,}130}{199{,}581} = 2.42$$

Net A/R turnover:
$$\frac{135{,}987}{8{,}339} = 16.31 \qquad \frac{482{,}130}{5{,}624} = 85.73$$

Days Receivable:
$$\frac{365}{16.31} = 22.4 \text{ days} \qquad \frac{365}{85.73} = 4.3 \text{ days}$$

"Dupont" Analysis
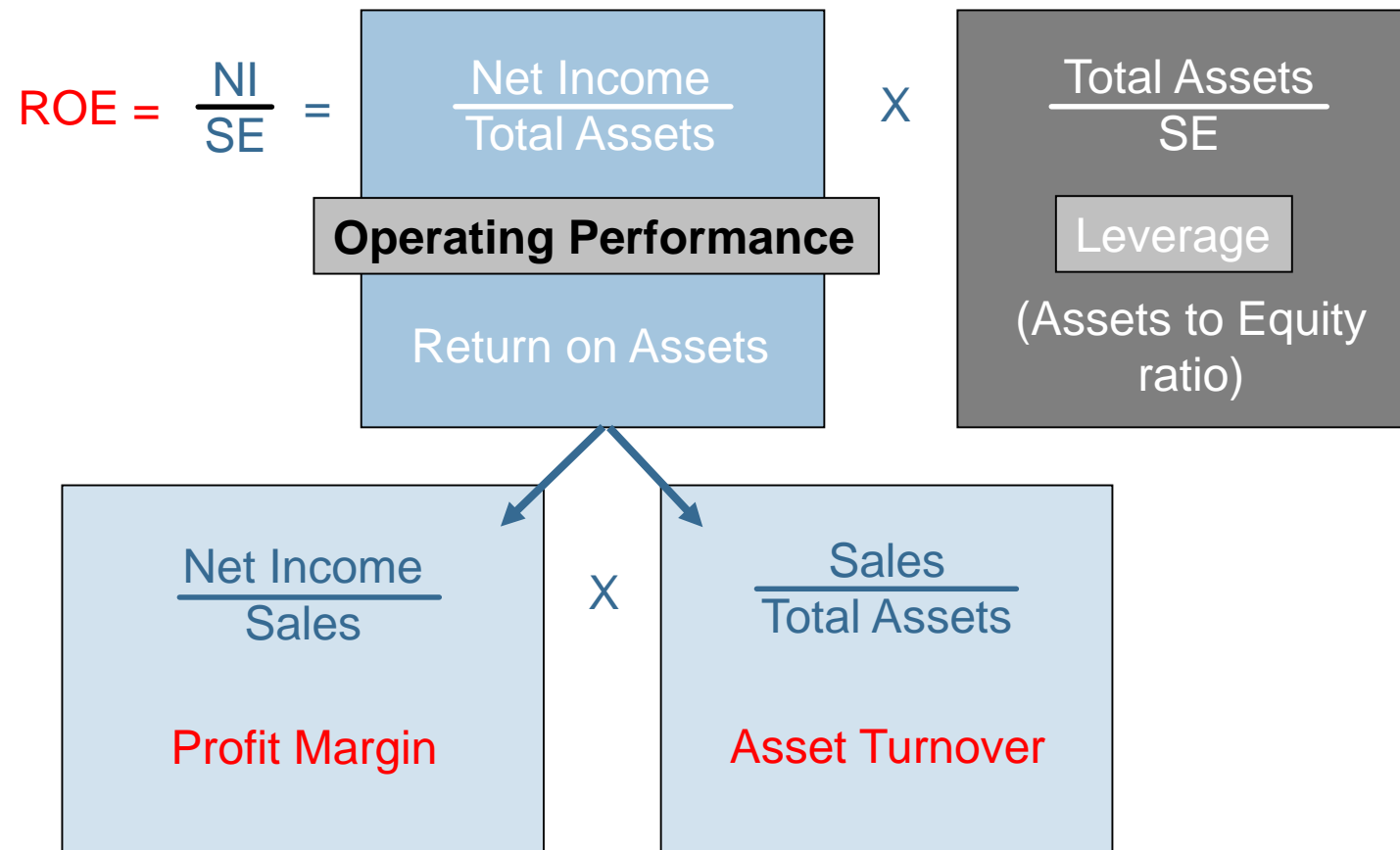# (Understanding the Drivers of Return on Equity)

$$\text{ROE} = \frac{NI}{SE} = \frac{\text{Net Income}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{SE}$$

Operating Performance

Return on Assets

Leverage

(Assets to Equity ratio)

$$\frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}}$$

Profit Margin

Asset Turnover

Completing the analysis:
What explains ROE differences?

NI/EQUITY   =   NI/SALES   *   SALES/ASSETS   *   ASSETS/EQUITY
   "ROE"   =   "Profit margin"   "Asset Turnover"   "Leverage"

ROE for Amazon:

2,371 / 19,285   =   2,371 / 135,987   *   135,987 / 83,402   *   83,402 / 19,285

    12.3%   0.017   *   1.63   *   4.32

ROE for Walmart:

14,694 / 80,546 =   14,694 / 482,130   *   482,130 / 199,581 *   199,581 / 80,546

    17.2%   =   0.03   *   2.42   *   2.48

What is an easy thing to do if Amazon wished to increase its ROE?
    If it paid a cash dividend, asset turnover and leverage would both increase.
    The reduction in interest income would slightly reduce NI, but overall ROE would increase.

Takeaway Slide

Introduced financial statement analysis and ratio analysis.

Important uses include:
- Determining compensation (including yours!)
- Comparing companies and aiding stock selection
- Valuing companies

Dupont model is a powerful way to understand drivers of profitability

Caveat:
Effect of leverage change on ROE

Suppose Walmart doubled its leverage while holding assets constant.
Would its ROA and ROE double?

NI/EQUITY	=	NI/SALES	*	SALES/ASSETS	*	ASSETS/EQUITY
"ROE"	=	"Profit margin"		"Asset Turnover"		"Leverage"

Current ROE for Walmart:

17.2%	=	0.03	*	2.42	*	2.48

ROE for Walmart with 2X leverage:

?	=	?	*	2.42	*	2 X 2.48

Assume asset turnover does not change, since assets are held constant.

Does Profit margin change?

Yes, assuming the additional leverage brings more interest expense.

A "better" measure of ROA

Return on Assets (ROA) = Earnings without Interest Expense / Total Assets

Earnings without Interest Expense (EWI) = Net income + [Interest expense X (1-statutory tax rate)]

Advantages:

Reflects idea that changes in leverage affect interest expense (after taxes); theoretically better; concept will be used in your finance classes to compute the value of unlevered firm.

Disadvantages:

More costly to compute; tax effects can be complicated as we will discuss next week