BA870: Topics in Financial & Accounting Analytics

Lecture #3 (Tuesday, March 29, 2022)

Professor Peter Wysocki

Topics: Financial Accounting Concepts - Ratios

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Financial Ratios, Strategy and Accounting

- Accounting & Financial Ratios:
  - Fingerprints or DNA of a company
  - Strategy, Operations, Competition and Economics

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Connecting Strategy & Accounting – Team Breakout Rooms

Below are 6 well-known global companies with very distinct markets, operations and strategies:

- Eli Lilly (pharmaceutical)

- Home Depot (big box specialty retailer)

- Publix Supermarkets Inc (grocer)

- Proctor & Gamble (consumer products)

- American Airlines Group (airline)

- Whirlpool (durable goods like appliances)

Common-Size Balance Sheets of the 6 Companies

	Company 1	Company 2	Company 3	Company 4	Company 5	Company 6
Cash	18%	4%	1%	1%	4%	16%
A/R	14%	5%	19%	3%	4%	4%
Inventories	9%	5%	19%	26%	22%	1%
Other current assets	4%	4%	8%	3%	2%	4%
Total current assets	46%	18%	47%	33%	32%	25%
PP&E	32%	14%	23%	62%	56%	47%
Other noncurrent assets	22%	68%	30%	5%	12%	28%
Total Assets	100%	100%	100%	100%	100%	100%
A/P	4%	4%	23%	13%	18%	4%
Other current liabilities	16%	12%	19%	16%	11%	19%
Total current liabilities	20%	16%	42%	29%	29%	23%
Long-term debt	17%	23%	20%	26%	39%	31%
Other noncurrent liabilities	12%	13%	10%	5%	10%	24%
Total Liabilities	49%	52%	72%	60%	78%	88%
Shareholders' equity	51%	48%	28%	40%	22%	12%
Total liabilities and equity	100%	100%	100%	100%	100%	100%

Common-Size Income Statements of 6 Companies

Sales	100%	100%	100%	100%	100%	100%
COGS	18%	44%	82%	66%	77%	76%
Gross profit	82%	56%	18%	34%	23%	24%
SG&A	51%	32%	9%	22%	18%	6%
Depreciation and amortization	5%	4%	3%	2%	2%	5%
Other	5%	1%	2%	1%	1%	10%
Pretax income	21%	19%	4%	9%	3%	3%
Taxes	5%	6%	1%	3%	1%	1%
Net income	16%	13%	3%	6%	2%	2%

Required: Based on this information, identify each company. You should cite at least 3 ratios (ie, Gross Profit/Sales %) to justify how you identified each company and give an short explanation for why the ratio helps identify the company (ie, "Companies in the Mining Industry typically have high PPE/Total Assets % because they are machinery intensive."). You should write your answers and notes on the attached answer sheet.

Review:
Profitability Ratios: ROA and ROE

- ROA (return on assets) indicates how efficient the company is at using its total assets to generate income.

- Common calculations for ROA are:

  ROA = Net Income/Total Assets   (NI & TA from current year annual report)

  ROA = Net Income/Beginning Total Assets   (NI for current year & TA for last year)

  ROA = Net Income/Avg Total Assets   (NI for current year & TA is avg over year)

- *NEW:* ROE captures returns to shareholders: ROE = Net Income/Avg Equity

The DuPont System

- Method to breakdown ROE into:
  - ROA and Equity Multiplier
- ROA is further broken down as:
  - Profit Margin and Asset Turnover
- Helps to identify sources of strength and weakness in current performance
- Helps to focus attention on value drivers
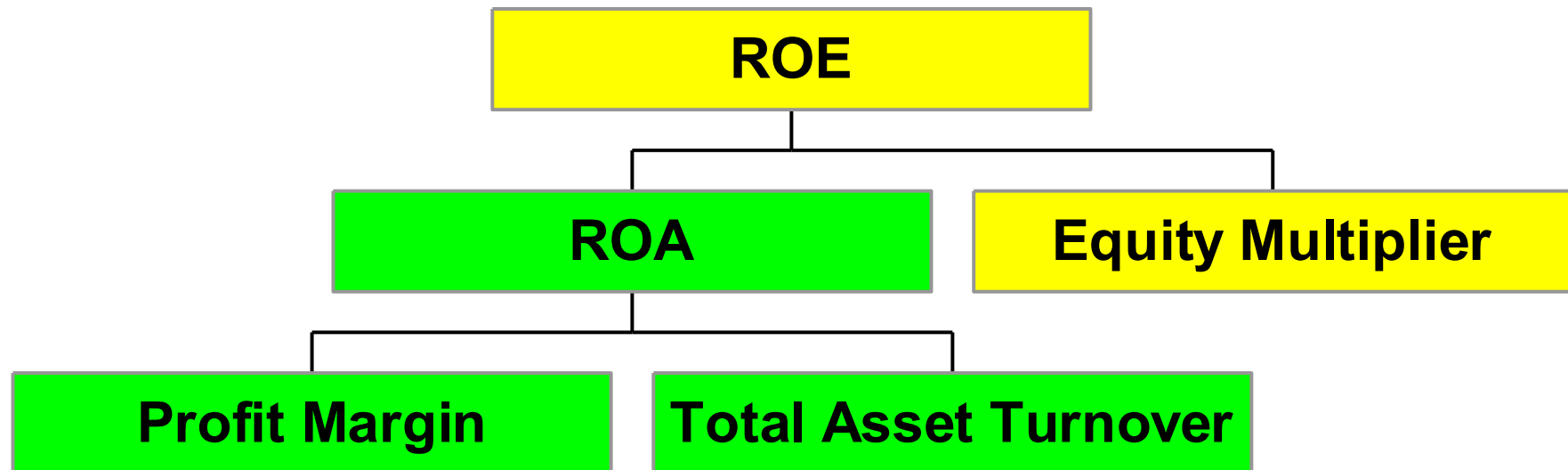
The DuPont System for ROE

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                    ┌─────────────┐
                    │     ROE     │
                    └─────────────┘
              ┌───────────┴───────────┐
      ┌─────────────┐         ┌───────────────────┐
      │     ROA     │         │ Equity Multiplier │
      └─────────────┘         └───────────────────┘
       ┌──────┴──────┐
┌───────────────┐ ┌────────────────────┐
│ Profit Margin │ │ Total Asset Turnover │
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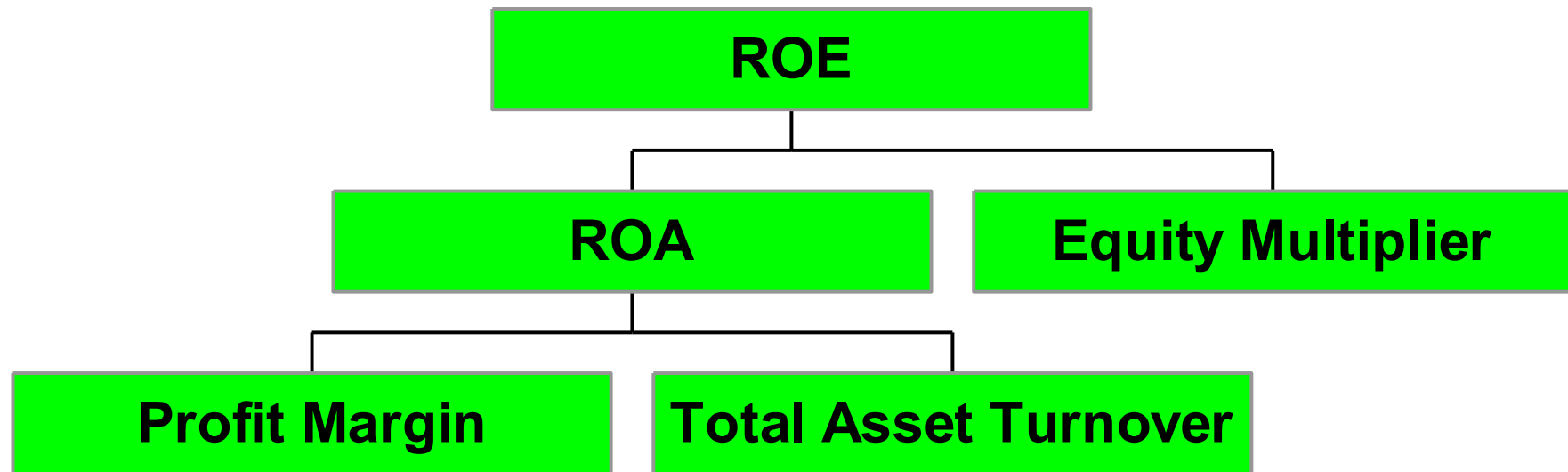
The DuPont System for ROE

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                    │       ROE       │
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              ┌──────────────┴──────────────┐
      ┌───────────────┐           ┌───────────────────────┐
      │      ROA      │           │   Equity Multiplier   │
      └───────────────┘           └───────────────────────┘
        ┌──────┴──────┐
 ┌───────────────┐  ┌───────────────────────┐
 │ Profit Margin │  │ Total Asset Turnover  │
 └───────────────┘  └───────────────────────┘
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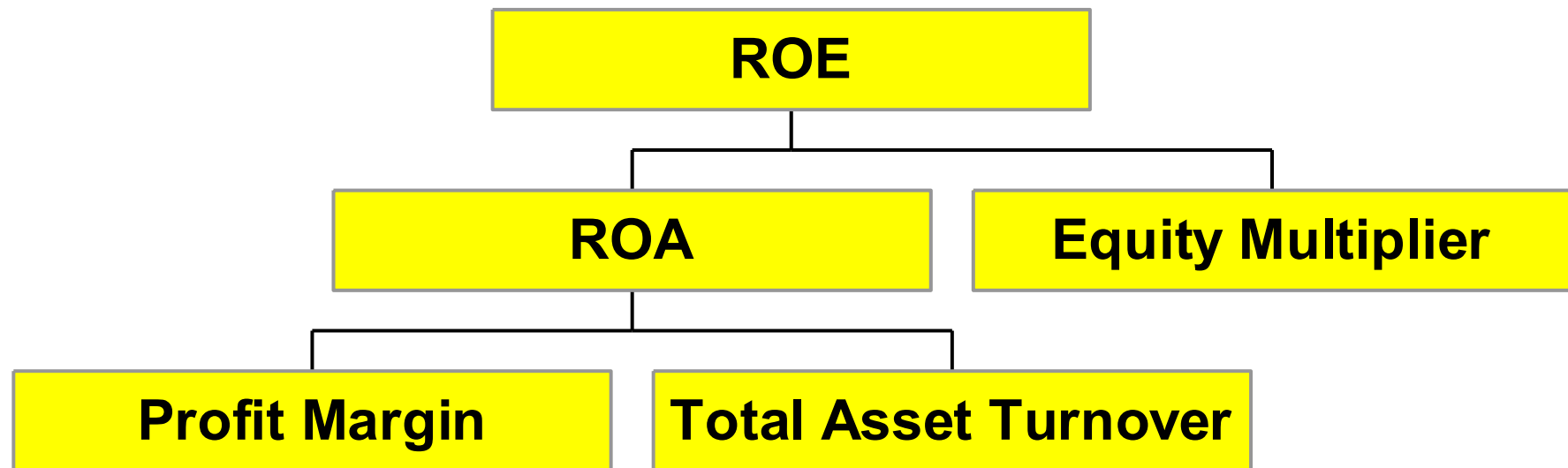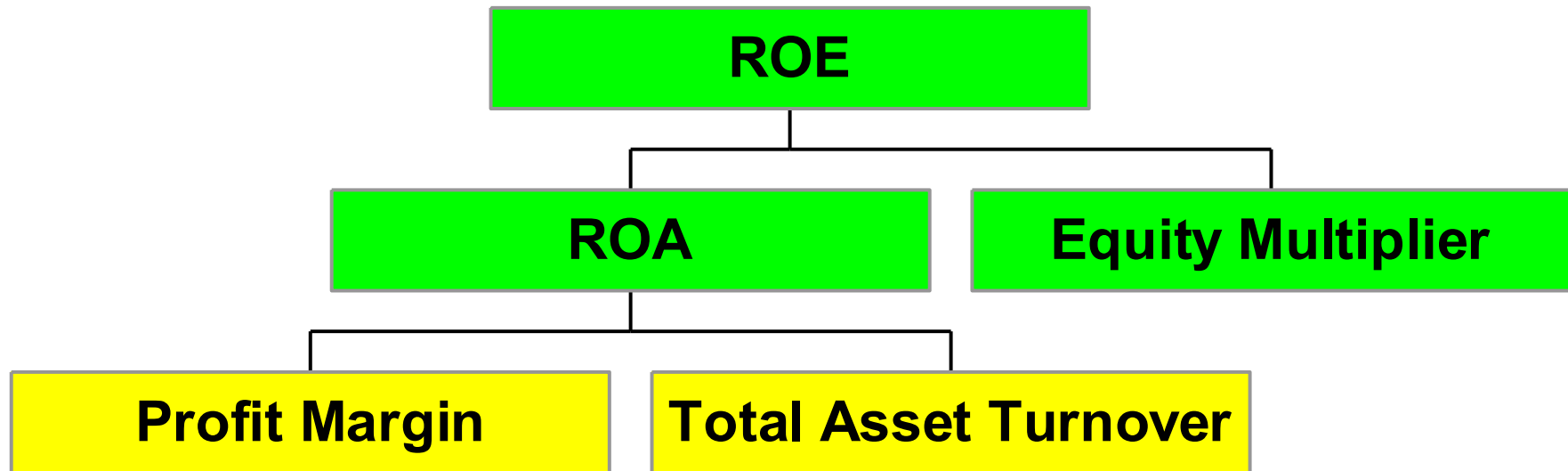
ROE = ROA* Equity Multiplier

= NI/Avg TA * [Avg TA]/[Avg Equity]

The DuPont System for ROE

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                    ┌─────────────────┐
                    │       ROE       │
                    └────────┬────────┘
              ┌──────────────┴──────────────┐
     ┌────────┴────────┐          ┌──────────┴──────────┐
     │       ROA       │          │  Equity Multiplier  │
     └────────┬────────┘          └─────────────────────┘
    ┌─────────┴─────────┐
┌───┴──────────┐ ┌──────┴──────────────┐
│ Profit Margin│ │ Total Asset Turnover│
└──────────────┘ └─────────────────────┘
```

ROA = Profit Margin*Asset Turnover

= NI/Sales * Sales/[Avg TA]

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The DuPont System for ROE

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                    ┌──────────────────┐
                    │       ROE        │
                    └──────────────────┘
             ┌───────────────┴────────────────┐
    ┌──────────────────┐          ┌──────────────────────┐
    │       ROA        │          │  Equity Multiplier   │
    └──────────────────┘          └──────────────────────┘
      ┌────────┴─────────┐
┌──────────────┐  ┌────────────────────────┐
│ Profit Margin │  │  Total Asset Turnover  │
└──────────────┘  └────────────────────────┘
```

ROE   = Profit Margin*Asset Turnover*Equity Multiplier

        = NI/Sales * Sales/[Avg TA] * [Avg TA]/[Avg Equity]

Financial Ratios – Used to Measure A Company's Health and Performance

The ratios may be divided into these types:

1. **Liquidity ratios**, that look at the availability of cash for operations.

2. **Asset management ratios** evaluate the efficient utilization of the resources.

3. **Debt management ratios** keep track of debt to be within reasonable bounds, and keep the debt level at its optimal level.

4. **Profitability ratios** measure the degree of accounting profits.

5. **Market value ratios** help investors discriminate between overvalued and undervalued securities while making investment decisions.

Liquidity Ratios

First we look at the liquidity ratios of a company. These ratios focus on the availability of cash to manage the day to day operations of the company. In particular, we define the current ratio as

$$\text{Current ratio} = \frac{\text{Total current assets}}{\text{Total current liabilities}}$$

The current ratio of a company gives us a quick way to look at its current assets and current liabilities. They should be nearly equal to one another. Next, we look at a more stringent ratio that gives us the cash position of the firm more accurately by removing the value of the inventories from the current assets. This gives us the quick ratio, or the acid test ratio, as follows:

$$\text{Quick, or Acid Test} = \frac{\text{Current assets} - \text{inventories}}{\text{Current liabilities}}$$

Asset Management Ratios

$$\text{Inventory Turnover} = \frac{\text{Cost of goods sold}}{\text{Inventories (average)}}$$

This ratio measures the efficient use of inventories. A firm should have a high turnover ratio, which is managed through a small amount of inventories. This means that a firm should have a small inventory and try to sell it as quickly as possible. Unfortunately, a small inventory also means lower sales.

Closely related to the inventory management is the management of receivables. A company should have a small amount invested in the receivables. That is, the company should try to sell the goods for cash. To measure the efficiency of this operation, we define the Days Sales Outstanding as

$$\text{Days sales outstanding} = \frac{\text{Receivables}}{\text{Sales per day}}$$

Asset Management Ratios

A broader measure of the efficiency of use of assets is the fixed assets turnover. This ratio is defined as follows.

$$\text{Fixed assets turnover} = \frac{\text{Annual sales}}{\text{Net fixed assets (average)}}$$

$$\text{Total assets turnover} = \frac{\text{Annual sales}}{\text{Total assets (average)}}$$

This ratio looks at the aggregate assets of a company and measures the way the company utilizes them.

Debt Management Ratios

The corporations borrow money to do their business because debt capital is cheaper than the equity capital. On the other hand, excessive amount of debt can create problems for the company. To see the debt level of a company, we define its debt ratio, or leverage ratio as follows

$$\text{Debt ratio} = \frac{\text{Total debt}}{\text{Total assets}}$$

Of course, the companies must maintain their debt at an optimal level.

Another ratio that looks at the ability of a company to pay its interest when due is its *interest coverage ratio*, or *times interest earned*. This is defined as

$$\text{Interest coverage} = \frac{\text{EBIT}}{\text{Interest charges}}$$

Market Value Ratios

From an investor's point of view, it is important to see the difference between the market value of the stock of a company, and its accounting value, or book value. To get a perspective on this difference, we define the Market/Book ratio as

$$\text{Market/Book ratio} = \frac{\text{Market price/share}}{\text{Book value/share}}$$

The investors hunting for bargains like to see this ratio as small as possible. We complete our list by including two more ratios, defined as follows:

$$\text{P-E ratio} = \frac{\text{Market price/share}}{\text{Earnings/share}}$$

and

$$\text{Dividend yield} = \frac{\text{Dividend per share}}{\text{Market price per share}}$$

Expanded Use of Ratios: Z-Score for Bankruptcy Prediction

• The Z-score is a weighted combination of common financial ratios. Z-score coefficients were estimated from a set of firms which had declared bankruptcy & a matched set of "surviving" firms (matched by industry & approximate size).

• Altman applied the statistical method of discriminant analysis to a dataset of publicly held manufacturers. The estimation was originally based on data from publicly held manufacturers.

• The original data sample had 66 manufacturing firms, half of which had filed for Chapter 7 bankruptcy.

- The analysis has also been re-estimated based on other datasets for private manufacturing, non-manufacturing and service companies.

Altman's Z-Score

The original Z-score formula was as follows:

$$Z = 1.2*T1 + 1.4*T2 + 3.3*T3 + 0.6*T4 + .99*T5$$

T1 = Working Capital / Total Assets = (CA-CL) / Total Assets

T2 = Retained Earnings / Total Assets

T3 = Earnings Before Interest and Taxes / Total Assets

T4 = Market Value of Equity / Book Value of Total Liabilities

T5 = Sales/Total Assets.

Z-Score: Distressed & Non-Distressed Firms

- Altman found that the ratio profile for the bankrupt group fell at -0.25 average, and for the non-bankrupt group at +4.48 average.

Zones of Discrimination:

Z > 2.99	*"Safe" Zone*
1.8 < Z < 2.99	*"Grey" Zone*
Z < 1.80	*"Distress" Zone*

Altman's Z-Score - General Motors

Financial Data from Annual Report for year ended December 31, 2007:

T1 = Working Capital / Total Assets = (CA-CL) / Total Assets
= ($60B – $70B)/$149B = **-0.067**

T2 = Retained Earnings / Total Assets
= - $39B/149B = **-0.262**

T3 = Earnings Before Interest and Taxes / Total Assets
= - 4.4B/$149B = **-0.030**

T4 = Market Value of Equity / Book Value of Total Liabilities
= **$7B/$186B** = **0.038**

T5 = Sales/Total Assets
= $181B/$149B = **1.21**

Z = 1.2*T1 + 1.4*T2 + 3.3*T3 + 0.6*T4 + .99*T5
= 1.2*-0.067+1.4*-0.262+3.3*-0.03+0.6*0.038+0.99*1.21= 0.67 → **Distress zone**
NOTE: General Motors filed for Chapter 11 bankruptcy on June 1, 2009