

## 10. Productivity Ratios and Profitability Analysis

### 10.1.1 Productivity Ratios

*Total Asset Turnover, TAT*

$$(56) \quad \frac{\text{Net Sales}}{\text{Total Assets}}$$

It measures efficiency of total assets in producing sales (usually average of total assets)

*Fixed Assets Turnover*

$$(57) \quad \frac{\text{Net Sales}}{\text{Fixed Assets}}$$

It measures efficiency of fixed assets in producing sales.

*Current Assets Turnover*

$$(58) \quad \frac{\text{Net Sales}}{\text{Current Assets}}$$

It measures efficiency of current assets in producing sales.

### 10.1.2 Profitability Ratios

Profitability ratios measure the earning ability of a company.

*Gross Margin*

$$(59) \quad \frac{\text{Net Income} - \text{COGS}}{\text{Net Sales}}$$

This ratio measures gross margin in each sales dollar.

*EBITDA Margin*

$$(60) \quad \frac{\text{EBITDA}}{\text{Net Sales}}$$

This ratio measures EBITDA (EBIT+depreciation) margin in each sales dollar.

*Operating Profit Margin*

$$(61) \quad \frac{\text{Net Operating Income}}{\text{Net Sales}}$$

*Pretax Margin*

$$(62) \quad \frac{\text{Income Before Income Taxes}}{\text{Net Sales}}$$

This ratio measures pretax margin in each sales dollar.

*Effective Tax Rate*

$$(63) \quad \frac{\text{Income Taxes}}{\text{Income Before Income Taxes}}$$

This ratio measures effective income tax rate.

*Net Profit Margin, Return on Sales*

$$(64) \quad \frac{\text{Net Income}}{\text{Net Sales}}$$

This ratio measures net income in each sales dollar.

*Return on Total Assets*

$$(65) \quad \frac{\text{Net Income}}{\text{Total Assets}}$$

This ratio measures overall profitability of assets.

*Pretax ROA*

$$(66) \quad \frac{\text{Income Before Income Taxes}}{\text{Total Assets}}$$

*Return on Net Assets*

$$(67) \quad \text{ROA} = \frac{\text{Net Operating Income} \times (1 - T)}{\text{Total Net Assets}}$$

*Return on Capital Invested (the same as above formula, different name)*

$$(68) \quad \text{ROIC} = \frac{\text{EBIT} \times (1 - T)}{\text{Equity} + \text{LT Debt}}$$

This ratio measures overall profitability of net assets (fixed assets + net current assets). It can be compared with a long term IRR using FCFE cash flows.

*Return on Equity*

$$(69) \quad \text{ROE} = \frac{\text{Net income}}{\text{Equity}}$$

This ratio measures overall profitability of equity. It can be compared with a long term IRR using FCFE cash flows.

*Return on Common Stockholders' Equity*

$$(70) \quad \text{ROCSE} = \frac{\text{Net income} - \text{Preferred Dividends}}{\text{Equity}}$$

This ratio measures profitability of common stock owners.

### 10.1.3 DuPont Analysis

$$\text{Reinvestment Rate} = \frac{\text{Retained Earning}}{\text{Equity}}$$

$$\frac{\text{Net Sales}}{\text{Assets}} \times \frac{\text{Taxable Income}}{\text{Net Sales}} \times \frac{\text{Assets}}{\text{Equity}} \times \frac{\text{Net Income}}{\text{Taxable Income}} \times \frac{\text{Net Income} - \text{Dividends}}{\text{Net Income}}$$

Total Asset Turnover x Pretax Margin = Pretax ROA

Pretax ROA x Leverage (Assets/Equity) = Pretax ROE

Pretax ROE x Tax Compliment (equal to (1 - Tax Rate)) = ROE

ROE x Earnings Retention ((Net Income - Dividends)/Net Income) = Reinvestment Rate

## Task 10

1. Calculate productivity ratios
2. Calculate profitability ratios
3. Prepare DuPont Analysis

## Problem 23. Productivity Ratios

<b>Required:</b>			
Calculate and interpret productivity ratios.			
<b>Solution</b>			
	<i>Dec. 31, 2014</i>	<i>Dec. 31, 2013</i>	<i>Dec. 31, 2012</i>
<i>Total Asset Turnover, TAT</i>			
$\frac{\text{Net Sales}}{\text{Total Assets}}$	0,50	0,52	0,56
	0,51	0,53	0,58
<i>Fixed Assets Turnover</i>			
$\frac{\text{Net Sales}}{\text{Fixed Assets}}$	0,78	0,80	0,86
<i>Current Assets Turnover</i>			
$\frac{\text{Net Sales}}{\text{Current Assets}}$	1,39	1,50	1,58

## Problem 24. Profitability Ratios

<b>Required:</b>			
Calculate and interpret profitability ratios.			
<b>Solution</b>			
	<i>Dec. 31, 2014</i>	<i>Dec. 31, 2013</i>	<i>Dec. 31, 2012</i>
<i>Gross Margin</i>			
$\frac{\text{Net Income - COGS}}{\text{Net Sales}}$	61,1%	60,7%	60,3%
<i>EBITDA Margin</i>			
$\frac{\text{EBITDA}}{\text{Net Sales}}$	25,4%	26,0%	26,6%
<i>Operating Profit Margin</i>			
$\frac{\text{Net Operating Income}}{\text{Net Sales}}$	21,1%	21,8%	22,4%
<i>Pretax Margin</i>			
$\frac{\text{Income Before Income Taxes}}{\text{Net Sales}}$	20,3%	24,5%	24,6%
<i>Effective Tax Rate</i>			
$\frac{\text{Income Taxes}}{\text{Income Before Income Taxes}}$	23,6%	24,8%	23,1%
<i>Net Profit Margin, Return on Sales</i>			
$\frac{\text{Net Income}}{\text{Net Sales}}$	15,5%	18,4%	18,9%
<i>Return on Total Assets</i>			
$\frac{\text{Net Income}}{\text{Total Assets}}$	7,7%	9,6%	10,5%
<i>Pretax ROA</i>			
$\frac{\text{Income Before Income Taxes}}{\text{Total Assets}}$	10,1%	12,7%	13,7%
<i>Return on Net Assets</i>			
$\text{ROA} = \frac{\text{Net Operating Income} \times (1 - T)}{\text{Total Net Assets}}$	8,1%	8,5%	9,6%
<i>Return on Capital Invested (the same as above formula)</i>			
$\text{ROIC} = \frac{\text{EBIT} \times (1 - T)}{\text{Equity} + \text{LT Debt}}$			
<i>Return on Equity</i>			
$\text{ROE} = \frac{\text{Net Income}}{\text{Equity}}$	23,3%	25,8%	27,4%
<i>Return on Common Stockholders' Equity</i>			
$\text{ROCSE} = \frac{\text{Net income} - \text{Preferred Dividendes}}{\text{Equity}}$	no preferred stock		

## Problem 25. DuPont Analysis

<b>Required:</b>			
Perform and discuss DuPont analysis			
<b>Solution</b>			
Reinvestment Rate = $\frac{\text{Retained Earning}}{\text{Equity}}$			
$\frac{\text{Net Sales}}{\text{Assets}} \times \frac{\text{Taxable Income}}{\text{Net Sales}} \times \frac{\text{Assets}}{\text{Equity}} \times \frac{\text{Net Income}}{\text{Taxable Income}} \times \frac{\text{Net Income} - \text{Dividends}}{\text{Net Income}}$			
Total Asset Turnover x Pretax Margin = Pretax ROA			
Pretax ROA x Leverage (Assets/Equity) = Pretax ROE			
Pretax ROE x Tax Compliment (equal to (1 - Tax Rate)) = ROE			
ROE x Earnings Retention ((Net Income - Dividends)/Net Income) = Reinvestment Rate			
<b>DuPont Earning Power</b>	<i>Dec. 31, 2014</i>	<i>Dec. 31, 2013</i>	<i>Dec. 31, 2012</i>
Asset Turnover	0,50	0,52	0,56
x Pretax margin	20,3%	24,5%	24,6%
Pretax ROA	10,1%	12,7%	13,7%
x Leverage (Assets/Equity)	3,01	2,69	2,60
Pretax ROE	0,31	0,34	0,36
x Tax Complement	76,4%	75,2%	76,9%
ROE	23,3%	25,8%	27,4%
x Earnings Retention	24,9%	42,4%	49,4%
Reinvestment Rate	5,8%	10,9%	13,5%