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Reading 24: Financial Analysis Techniques

Learning Outcome Statements

- Covered
  - 24a, 24b, 24c, 24d, 24e, 24f, 24g

- Not Covered
  - None

Ratios

- Economically important relationship between 2 numbers
- Assess past performance
- Estimate future performance

Examples:

- Forecast future profits or cash flow
- Growth prospects

Common-Size Analysis

Common-size statements: Assist in cross-sectional comparison
Common-size income statement: Percentage of sales or revenue

$$\text{Vertical common-size income statement percentage} = \frac{\text{Income statement account}}{\text{Revenue}} \times 100$$

- Cost trends
- Key ratios listed

Common-Size Analysis

Common-size balance sheets:

- Percentage of assets
- Changes in mix

$$\text{Vertical common-size balance sheet percentage} = \frac{\text{Balance sheet account}}{\text{Total assets}} \times 100$$

Note:

- Subject to management assumptions
- Directs further analysis

Cross-Sectional vs. Trend Analysis

Cross-sectional analysis

- Compares between companies
- Accounts for varying size

Trend analysis

- Compares between past results for 1 company
- Helpful for forecasting

Horizontal common-size financial statements:

- Divide by a baseline historical figure
- Look for changes in business structure

Practice Question

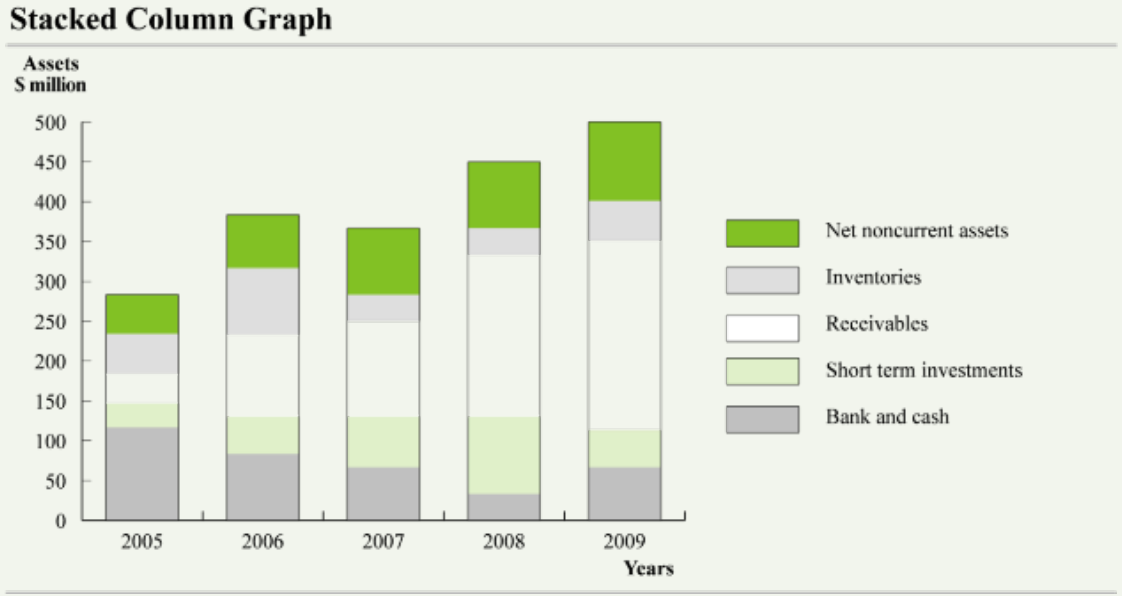
Which of the following is *most likely* to be used to conduct trend analysis?

A. Horizontal common-size financial statements
B. Vertical common-size financial statements
C. Pie charts

Uses of Charts in Financial Analysis

Graphs

- Communication tool
- A stacked common graph highlights mix changes



Uses of Charts in Financial Analysis

Pie charts

- Makeup of total value
- For example, component share of total expenses

Line graphs

- Direction and magnitude trending
- Useful to view movement of a key account over time

Limitations of Ratio Analysis

- Cross-sectional analysis difficult for complex firms
- Potentially conflicting results
- Must be taken in context—not useful in a vacuum
- Potentially subject to differing accounting assumptions
- IFRS vs. GAAP

Practice Question

Which of the following is *least likely* a limitation of ratio analysis?

A. Companies may have several divisions that operate in different industries.
B. Most companies around the world subscribe to the same set of accounting standards.
C. There are no specified ranges within which particular ratios for companies must lie.

Interpretation and Context

- Understand differences
- Compare with stated objectives
- Industry-specific
- Business segments
- Different standards
- Different life cycle stages
- Business cycles

Categories of Ratio Analysis

Activity ratios productivity and efficiency

Liquidity ratios ability to meet short-term

Solvency ratios ability to meet long-term

Profitability ratios ability to generate return

Valuation ratios quantity of asset or flow

Activity Ratios

How efficiently are operations managed?

Inventory Turnover

$$\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

Days of Inventory on Hand

$$\text{Days of inventory on hand (DOH)} = \frac{365}{\text{Inventory turnover}}$$

Activity Ratios

Receivables Turnover

$$\text{Receivables turnover} = \frac{\text{Revenue}}{\text{Average receivables}}$$

Days of Sales Outstanding

$$\text{Days of sales outstanding (DSO)} = \frac{365}{\text{Receivables turnover}}$$

Payables Turnover

$$\text{Payables turnover} = \frac{\text{Purchases}}{\text{Average trade payables}}$$

$$\text{Purchases} = \text{Ending inventory} + \text{COGS} - \text{Opening inventory}$$

Activity Ratios

Number of Days of Payables

$$\text{Number of days of payables} = \frac{365}{\text{Payables turnover}}$$

Working Capital Turnover

$$\text{Working capital turnover} = \frac{\text{Revenue}}{\text{Average working capital}}$$

Fixed Asset Turnover

$$\text{Fixed asset turnover} = \frac{\text{Revenue}}{\text{Average fixed assets}}$$

Activity Ratios

Total Asset Turnover

$$\text{Total Asset Turnover} = \frac{\text{Revenue}}{\text{Average total assets}}$$

Liquidity Ratios

Current Ratio

$$\textbf{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

Quick Ratio

$$\textbf{Quick ratio} = \frac{\text{Cash + Short-term marketable investments + Receivables}}{\text{Current liabilities}}$$

Liquidity Ratios

Cash Ratio

$$\textbf{Cash ratio} = \frac{\text{Cash} + \text{Short-term marketable investments}}{\text{Current liabilities}}$$

Defensive Interval Ratio

$$\textbf{Defensive interval ratio} = \frac{\text{Cash} + \text{Short-term marketable investments} + \text{Receivables}}{\text{Daily cash expenditures}}$$

Liquidity Ratios

Cash Conversion Cycle

How many days does it take the company to go from working capital investment to collected sales?

Cash conversion cycle = DSO + DOH - Number of days of payables

Solvency Ratios

Debt-to-Assets Ratio

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

Debt-to-Capital Ratio

$$\text{Debt-to-capital ratio} = \frac{\text{Total debt}}{\text{Total debt} + \text{Shareholders' equity}}$$

Solvency Ratios

Debt-to-Equity Ratio

$$\text{Debt-to-equity ratio} = \frac{\text{Total debt}}{\text{Shareholders' equity}}$$

Financial Leverage Ratio

$$\text{Financial leverage ratio} = \frac{\text{Average total assets}}{\text{Average total equity}}$$

Interest Coverage Ratio

$$\text{Interest coverage ratio} = \frac{\text{EBIT}}{\text{Interest payments}}$$

Solvency Ratios

Fixed Charge Coverage Ratio

$$\text{Fixed charge coverage ratio} = \frac{\text{EBIT} + \text{Lease payments}}{\text{Interest payments} + \text{Lease payments}}$$

Profitability Ratios

Gross Profit Margin

$$\text{Gross profit margin} = \frac{\text{Gross profit}}{\text{Revenue}}$$

Operating Profit Margin

$$\text{Operating profit margin} = \frac{\text{Operating profit}}{\text{Revenue}}$$

Profitability Ratios

Pretax Margin

$$\textbf{Pretax margin} = \frac{\text{EBT (earnings before tax, but after interest)}}{\text{Revenue}}$$

Net Profit Margin

$$\textbf{Net profit margin} = \frac{\text{Net profit}}{\text{Revenue}}$$

Profitability Ratios

Return on Assets

$$\text{ROA} = \frac{\text{Net income}}{\text{Average total assets}}$$

Adjusted ROA

$$\text{Adjusted ROA} = \frac{\text{Net income} + \text{Interest expense}\,(1 - \text{Tax rate})}{\text{Average total assets}}$$

Operating ROA

$$\text{Operating ROA} = \frac{\text{Operating income or EBIT}}{\text{Average total assets}}$$

Profitability Ratios

Return on Total Capital

$$\text{Return on total capital} = \frac{\text{EBIT}}{\text{Short-term debt} + \text{Long-term debt} + \text{Equity}}$$

Return on Equity

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Average total equity}}$$

Profitability Ratios

Return on Common Equity

$$\text{Return on common equity} = \frac{\text{Net income - Preferred dividends}}{\text{Average common equity}}$$

Practice Question

Which of the following classifications of ratios is *most likely* to be used to evaluate a firm's ability to meet its long-term debt obligations?

A. Liquidity ratios
B. Solvency ratios
C. Activity ratios

Practice Question

Which of the following classifications of ratios is *least likely* to be used to evaluate a firm's operating efficiency?

A. Profitability ratios
B. Solvency ratios
C. Activity ratios

Combinations of Ratios Approach

Multiple ratio types used in conjunction

Example

	2008	2007	2006
Current ratio	2.2	2.0	1.7
Quick ratio	0.7	0.8	0.9

Current ratio increasing while quick ratio decreasing, look at turnover ratios

	2008	2007	2006
DOH	56	46	31
DSO	25	29	51

Combinations of Ratios Approach

Conclusion

- Higher days inventory on hand increases current ratio but not quick
- Decreasing DSO means AR getting collected faster, decreasing both current and quick

Therefore:

- Faster AR collections are used to buy inventory, but inventory sales aren’t increasing in speed—leading to a higher current ratio but lower quick

Practice Question

A company's balance sheet indicates that it has sufficient cash and short-term investments. However, its payables turnover ratio remains low. This *most likely* suggests that:

A. The company has a liquidity crisis.
B. The company's suppliers offer it lenient credit terms.
C. The company has excellent receivables collection policies.

Practice Question

A higher working capital turnover *most likely* indicates:

A. Higher operating efficiency.
B. Poor liquidity management.
C. Lower operating efficiency.

DuPont Analysis

- Breakdown components of ROE
- View changes in components over time
- Can be used to analyze ROE differences across the industry
- Inform management decision making

Two-Way DuPont Decomposition

$$\text{ROE} = \underbrace{\frac{\text{Net income}}{\text{Average total assets}}}_{\text{ROA}} \times \underbrace{\frac{\text{Average total assets}}{\text{Average shareholder's equity}}}_{\text{Leverage}}$$

ROE is a function of company's return on assets (ROA) and financial leverage ratio.

DuPont Analysis

Three-Way DuPont Decomposition

ROE is a function of:

- Profitability
- Efficiency
- Solvency

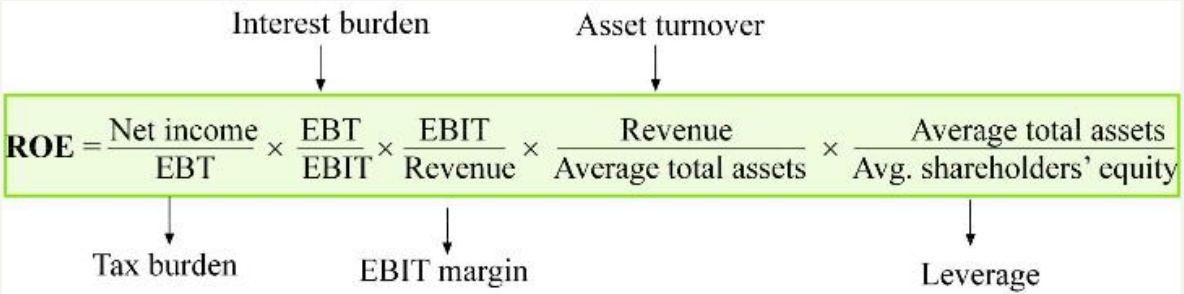
$$\text{ROE} = \underbrace{\frac{\text{Net income}}{\text{Revenue}}}_{\text{Net profit margin}} \times \underbrace{\frac{\text{Revenue}}{\text{Average total assets}}}_{\text{Asset turnover}} \times \underbrace{\frac{\text{Average total assets}}{\text{Average shareholders' equity}}}_{\text{Leverage}}$$

DuPont Analysis

Five-Way DuPont Decomposition

Breaks profitability into

- Taxes
- Interest
- Earnings before taxes



DuPont Analysis

- Total ROE remains constant across methods of Dupont breakdown.
- Further decomposed ROE allows more granular management examination.
- 5-way DuPont shows that higher leverage may not increase ROE because the interest ratio falls.

Practice Question

The following information relates to Stone Inc.:

Net profit margin = 15.7%
Return on assets = 20.57%
Financial leverage = 1.42
Asset turnover = 1.31

Stone Inc.'s return on equity is *closest to*:

A. 29.21%.
B. 4.59%.
C. 6.00%.

Practice Question

The following information relates to Jones Associates:

Tax burden ratio = 0.74
Interest burden ratio = 1.01
EBIT margin = 0.24
Asset turnover = 1.23
Financial leverage = 1.57

Jones Associates' ROE is *closest to*:

A. 46.35%.
B. 34.64%.
C. 46.81%.

Valuation Ratios

$$\text{P/E} = \frac{\text{Price per share}}{\text{Earnings per share}}$$

$$\text{P/CF} = \frac{\text{Price per share}}{\text{Cash flow per share}}$$

$$\text{P/S} = \frac{\text{Price per share}}{\text{Sales per share}}$$

$$\text{P/BV} = \frac{\text{Price per share}}{\text{Book value per share}}$$

Per-Share Quantities

$$\textbf{Basic EPS} = \frac{\text{Net income - Preferred dividends}}{\text{Weighted average number of ordinary shares outstanding}}$$

$$\textbf{Diluted EPS} = \frac{\text{Adjusted income available for ordinary shares reflecting conversion of dilutive securities}}{\text{Weighted average number of ordinary and potential ordinary shares outstanding}}$$

$$\textbf{Cash flow per share} = \frac{\text{Cash flow from operations}}{\text{Average number of shares outstanding}}$$

$$\textbf{EBITDA per share} = \frac{\text{EBITDA}}{\text{Average number of shares outstanding}}$$

$$\textbf{Dividends per share} = \frac{\text{Common dividends declared}}{\text{Weighted average number of ordinary shares}}$$

Dividend-Related Quantities

$$\textbf{Dividend payout ratio} = \frac{\text{Common share dividends}}{\text{Net income attributable to common shares}}$$

$$\textbf{Retention Rate} = \frac{\text{Net income attributable to common shares} - \text{Common share dividends}}{\text{Net income attributable to common shares}}$$

Retention rate = (1 – Dividend payout ratio)

Sustainable growth rate = Retention rate × ROE

Practice Question

	2008 ($ '000)	2009 ($ '000)
Total revenue	242,500	367,700
Cost of goods sold	(112,300)	(197,500)
Gross profit	**130,200**	**170,200**
Depreciation	(12,900)	(16,800)
Salaries and wages	(7,700)	(8,100)
Electricity	(11,100)	(13,500)
Administrative expenses	(13,200)	(16,300)
Marketing	(17,200)	(22,200)
Operating lease payments	(14,000)	(17,100)
Operating income	**54,100**	**76,200**
Interest income	2,900	3,100
Interest expense	(2,100)	(2,400)
Income before taxes	**54,900**	**76,900**
Provision for income taxes	(24,000)	(23,000)
Net income	**30,900**	**53,900**

Practice Question

	2008 ($ '000)	2009 ($ '000)
Assets		
Long-term Assets		
Property, plant, and equipment	105,700	153,700
Investment in associates	68,600	80,600
Goodwill	47,100	54,100
Other long-term assets	38,500	44,500
Total Long-term Assets	**259,900**	**332,900**
Current Assets		
Inventory	4,900	6,200
Accounts receivable	5,300	7,500
Short-term marketable securities	6,200	8,300
Prepaid expenses	4,700	4,500
Cash	5,500	5,100
Total Current Assets	**26,600**	**31,600**
Total Assets	**286,500**	**364,500**
Shareholders' Equity and Liabilities		
Shareholders' Equity		
Common stock	100,000	100,000
10% Preferred stock	75,000	75,000
Retained earnings	31,000	42,500
Total Shareholders' Equity	**206,000**	**217,500**
Liabilities		
Long-term debt	72,000	134,700
Current Liabilities		
Accounts payable	4,700	6,700
Accrued expenses	3,800	5,600
Total Current Liabilities	**8,500**	**12,300**
Total Shareholders' Equity and Liabilities	**286,500**	**364,500**

Practice Question

Given the previous 2 slides:

Magma Corporation's debt-to-equity ratio for 2009 is *closest to*:
A. 0.38.
B. 0.35.
C. 0.62.

Practice Question

Given the previous 2 slides:

Magma Corporation's return on total capital for 2008 is *closest to*:

A. 18.88%.
B. 19.46%.
C. 21.64%.

Dividend-Related Quantities

Example: Calculating the Sustainable Growth Rate

The following data are available for Sedag Inc. Calculate its sustainable growth rate.

EPS	$3
Dividends per share	$1
Return on equity	10%

Dividend-Related Quantities

Example: Calculating the Sustainable Growth Rate

Solution

Dividend payout ratio = $1/$3 = 0.33
Retention ratio = 1 – 0.33 = 0.67
Sustainable growth rate (g) = 0.67 × 10% = 6.7%

Industry-Specific Ratios

Ratios	Numerator	Denominator
Business Risk		
Coefficient of variation of operating income	Standard deviation of operating income	Average operating income
Coefficient of variation of net income	Standard deviation of net income	Average net income
Coefficient of variation of revenues	Standard deviation of revenues	Average revenue
Service Companies		
Revenue per employee	Revenue	Total number of employees
Net income per employee	Net income	Total number of employees

Industry-Specific Ratios

Ratios	Numerator	Denominator
Financial Sector Ratios		
Capital adequacy—Banks	Various components of capital	Risk-weighted assets, market risk exposure, and level of operational risk assumed
Monetary reserve requirement	Reserves held at central bank	Specified deposit liabilities
Liquid asset requirement	Approved "readily marketable securities"	Specified deposit liabilities
Net interest margin	Net interest income	Total interest-earning assets

Industry-Specific Ratios

Ratios	Numerator	Denominator
Retail Ratios		
Same-store sales	Average revenue growth year on year for stores open in both periods	Not applicable
Sales per square foot (meter)	Revenue	Total retail space in feet or meters
Hotels		
Average daily rate	Room revenue	Number of rooms sold
Occupancy rate	Number of rooms sold	Number of rooms available

Credit Analysis

- Likelihood of defaulting on debt
- Business risk and financial risk help ratings agencies determine overall credit risk

Business risk

- Variability of sales measures

Financial risk

- Potential issues deriving from debt relationships

Segment Analysis

Large companies may require more granular analysis

- Examine subsidiaries, divisions, geographical units, business segments…

Business Segment:

- Identifiably separate, different risks

Geographical Segment:

- Business segment separated by location

Practice Question

Given the previous 2 slides:

Which of the following is *not* a requirement to conduct segment reporting:

A. Separately identifiable
B. Subject to different risks than the rest of the company
C. Must be a defined subsidiary

Practice Question

Also given those previous 2 slides:

Which of the following is *not* a basis for segment reporting:

A. Similar geographical regions
B. Distinct business segment
C. Separate operating unit

Forecasting

Develop models and projected statements

Techniques:

- **Sensitivity Analysis**
  - Change in 1 factor
- **Scenario Analysis**
  - Change in multiple factors simultaneously
- **Simulations**
  - Computer projections of multiple scenario analyses

Practice Question

Given the previous slide:

A firm decides to project itspossible future net income by changing just expected sales. This is an example of:

A. Scenario analysis.
B. Sensitivity analysis.
C. Simulation.

Practice Question

And given that previous slide:

A firm decides to project its possible future net income by changing expected sales, collection default rates, and the cost of its major production inputs. This would be an example of:

A. Scenario analysis.
B. Sensitivity analysis.
C. Simulation.

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Practice Questions with Solutions

Practice Question

Which of the following is *most likely* to be used to conduct trend analysis?

A. Horizontal common-size financial statements
B. Vertical common-size financial statements
C. Pie charts

Answer: A
Horizontal common-size financial statements are prepared to look for trends over time in evaluating a company's past performance and preparing forecasts.

Practice Question

Which of the following is *least likely* a limitation of ratio analysis?

A. Companies may have several divisions that operate in different industries.
B. Most companies around the world subscribe to the same set of accounting standards.
C. There are no specified ranges within which particular ratios for companies must lie.

Answer: B
Despite the growing convergence between IFRS and US GAAP, significant differences remain across the two sets of standards, which makes comparison across firms difficult.

Practice Question

Which of the following classifications of ratios is *most likely* to be used to evaluate a firm's ability to meet its long-term debt obligations?

A. Liquidity ratios
B. Solvency ratios
C. Activity ratios

Answer: B
Solvency ratios measure a company's ability to meet its long-term debt obligations.

Practice Question

Which of the following classifications of ratios is *least likely* to be used to evaluate a firm's operating efficiency?

A. Profitability ratios
B. Solvency ratios
C. Activity ratios

Answer: B
Solvency ratios measure a company's ability to meet its long-term debt obligations. They do not play a major role in evaluating the operating efficiency of a business.

Practice Question

A company's balance sheet indicates that it has sufficient cash and short-term investments. However, its payables turnover ratio remains low. This *most likely* suggests that:

A. The company has a liquidity crisis.
B. The company's suppliers offer it lenient credit terms.
C. The company has excellent receivables collection policies.

Answer: B
If the company has sufficient liquid assets and still has a low payables turnover ratio, its suppliers are probably offering lenient credit and collection terms.

Practice Question

A higher working capital turnover *most likely* indicates:

A. Higher operating efficiency.
B. Poor liquidity management.
C. Lower operating efficiency.

Answer: A
A higher working capital turnover ratio indicates that the company is utilizing its working capital efficiently to generate revenue.

Practice Question

The following information relates to Stone Inc.:
Net profit margin = 15.7%
Return on assets = 20.57%
Financial leverage = 1.42
Asset turnover = 1.31

Stone Inc.'s return on equity is *closest to*:

A. 29.21%.
B. 4.59%.
C. 6.00%.

Answer: A
ROE = Net profit margin × Asset turnover × Financial leverage
ROE = 15.7% × 1.31 × 1.42 = 29.21%

Practice Question

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Jones Associates' ROE is *closest to*:
A. 46.35%
B. 34.64%
C. 46.81%

Answer: B
ROE = Tax burden × Interest burden × EBIT margin × Asset turnover × Financial leverage
ROE = 0.74 × 1.01 × 0.24 × 1.23 × 1.57 = 34.64%

Practice Question

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Practice Question

Given the previous 2 slides:

Magma Corporation's debt-to-equity ratio for 2009 is *closest to*:
A. 0.38.
B. 0.35.
C. 0.62.

Answer: C

Debt to equity = Total debt/Shareholders' equity
Debt to equity = 134,700/217,500 = 0.619

Practice Question

Given the previous 2 slides:

Magma Corporation's return on total capital for 2008 is *closest to*:

A. 18.88%.
B. 19.46%.
C. 21.64%.

Answer: B

Return on total capital = EBIT/(Short-term debt + Long-term debt + Equity)

Return on total capital = 54,100/(72,000 + 206,000) = 19.46%

Magma Corporation does not have any short-term debt outstanding.

Practice Question

Which of the following is *not* a requirement to conduct segment reporting:

A. Separately identifiable
B. Subject to different risks than the rest of the company
C. Must be a defined subsidiary

Answer: A
While a separately defined subsidiary may be a valid reason to report as a separate segment, it is not required to do so. A business can identify a segment on other bases as well.

Practice Question

Which of the following is not a basis for segment reporting:

A. Similar geographical regions
B. Distinct business segment
C. Separate operating unit

Answer: C
A business could segment report based on portions of its business taking place in different geographical regions.

Practice Question

Given the previous slide:

A firm decides to project itspossible future net income by changing just expected sales. This is an example of:

A. Scenario analysis.
B. Sensitivity analysis.
C. Simulation.

Answer: B
Sensitivity analysis measures the impact on a projection figure based on changing only one input variable and leaving the rest constant.

Practice Question

And given that previous slide:

A firm decides to project its possible future net income by changing expected sales, collection default rates, and the cost of its major production inputs. This would be an example of:

A. Scenario analysis.
B. Sensitivity analysis.
C. Simulation.

Answer: A
Scenario analysis measures the impact on a projection figure based on changing multiple input variables and leaving the rest constant.