

Profitability Analysis, ROCE, NOPAT and RNOA

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Probability Analysis by Summer Peebles, Inc.'s

Probability analysis plays a crucial role in understanding and interpreting financial data. Probability theory deals with the likelihood of events occurring. Key concepts: Total probability is the sum of probabilities for all possible outcomes, always equalling 100%, such as a coin toss; there is a 50% probability it will land heads up and a 50% probability it will land tails up.

Other normal distributions and standard deviations explain the normal distribution has essential traits, including the relationship between standard deviation, probability, and data distribution. The curve of a normal distribution indicates what percentage of data falls within specific standard deviations units from the mean, which helps to estimate probability.

Another use of probability calculations is in financial applications: **Stock market predictions** indicate that probability calculations are used in economic forecasts. For instance, predict the most probability percentage drop in the stock market due to interest rate changes. **Risk assessment** assessing the likelihood of specific events (e.g., market crashes, defaults) helps investors manage risk. **Bayesian probability distribution** analysts determine the best-fitting probability distributions for a given dataset; this derived distribution is then used for further analysis.

Thus, probability analysis allows us to quantify uncertainty, make informed decisions, and model financial variables. Probability theory is a powerful financial tool, whether estimating returns, assessing risk, or predicting market behavior. Such as Return on Common Equity (ROCE), Return on Net Operating Assets (RNOA), and NOPAT. For the financial ratio calculation by Summer Peebles, Inc.'s financial data in 2014 below:

Assets	2014
Current Assets	\$ 250,000.00
Noncurrent Assets	\$ 1,750,000.00
Total Assets	\$ 2,000,000.00
Liabilities and Equity	
Current Liabilities	\$ 200,000.00
Noncurrent Liabilities (8% Bonds)	\$ 675,000.00
Common Stockholders' Equity	\$ 1,125,000.00
Total Liabilities and Equity	\$ 2,000,000.00
Additional Information	
Net Income	\$ 157,500.00
Income tax rate is 50%	
Amount for total assets and share holders' equity are the same for 2013 and 2014	
All assets and current liabilities are considered to be operating	

Return on Common Equity (ROCE)

Return on Common Equity (ROCE) is a financial ratio that measures how much profit a company makes from its common equity. Common equity is the amount of money that the company's common shareholders have invested in the business. ROCE shows how well the company uses its common equity to generate income for its shareholders. ROCE is calculated by dividing the company's earnings before interest and tax (EBIT) by its average common equity. EBIT is the company's operating profit before paying interest and tax expenses. Average common equity is the average common equity at the period's beginning and end. ROCE written formula as like this:

$$\text{ROCE} = \frac{\text{Earning before interest and tax (EBIT)}}{\text{Common Stockholders' Equity}}$$

Here is a Summer Peebles, Inc.'s of how to calculate ROCE with or without leverage:

1. Leverage uses debt to finance a company's operations and assets. Leverage can affect the return on common equity (ROCE) ratio in different ways, depending on the cost and benefit of borrowing. If a company uses leverage, it increases its capital employed by adding debt. The company must generate higher EBIT to maintain or increase its ROCE. However, leverage also increases the interest expense, which reduces the EBIT. Therefore, the net effect of leverage on ROCE depends on whether the return on debt (EBIT/Debt) is higher or lower than the cost of debt (Interest/Debt). If the return on debt is higher than the cost of debt, leverage will increase the ROCE. This means the company can earn more from its debt than it pays in interest. This is also known as positive financial leverage. If the return on debt is lower than the cost of debt, leverage will decrease the ROCE. This means the company is paying more interest than it earns from its debt. This is also known as negative financial leverage.

Sum

$$\text{With leverage on ROCE} = \frac{\$157,500}{\$1,125,000} = 14\%$$

Calculate EBIT: To calculate EBIT, we need to add the interest and taxes to the net income. Since the net income for 2014 is \$157,500 and the income tax rate is 50%, we can infer that the taxes are \$157,500 as well. The interest is 8% of the noncurrent liabilities, which are \$675,000. Therefore, the interest is \$54,000. Adding these amounts to the net income, we get:

$$\text{EBIT} = \$157,500 + \$157,500 + \$54,000 = \$369,000$$

Calculate Capital Employed without Leverage: To calculate capital employed with leverage, we need to add the equity and the debt. The equity is the common stockholders'

equity, which is \$1,125,000. The debt is the noncurrent liabilities, which are \$675,000.

Therefore, the capital employed without leverage is:

$$\text{Capital Employed without leverage} = 1,125,000 + \$675,000 = \$1,800,000$$

Net Income	\$ 157,500.00
Income tax rate 50%	\$ 157,500.00
Profit (with leverage)	\$ 315,000.00
Interest Expense	\$ 54,000.00
Earning Before Interest and tax (whithout leverage)	\$ 369,000.00
Tax expense (without leverage)	\$ 184,500.00
Net Income (without leverage)	\$ 184,500.00

$$\text{Without leverage on ROCE} = \frac{\$184,500}{\$1,800,000} = 10.25\%$$

Thus, leveraging the long-term debt raises the ROCE for Summer Peebles, Inc., stockholders from 10.25% to 14.00%, a positive outcome that benefits the shareholders.

Net Operating Profits After Taxes (NOPAT)

Net operating profits after taxes (NOPAT) measures how much profit a company makes from its core operations after paying taxes without considering the effects of debt. NOPAT is useful for comparing the profitability of different companies with different debt or tax rates. To calculate NOPAT, use one of these formulas:

$$\text{NOPAT} = \text{Operating Income} * (1 - \text{Tax Rate})$$

OR

$$\text{NOPAT} = (\text{Net Income} + \text{Non-Operating Losses} - \text{Non-Operating Gains} + \text{Interest Expense} + \text{Taxes}) * (1 - \text{Tax Rate})$$

Operating income is the company's income from normal business activities, such as selling goods or services. Net income is the company's income after deducting all expenses, including interest and taxes. Non-operating losses and gains are the income or expenses that the company incurs from activities unrelated to its core business, such as selling assets or paying fines. Interest expense is the cost of borrowing money from lenders. Taxes are the amount of money that the company pays to the government.

Return on Net Operating Assets (RNOA)

RNOA is a ratio that tells you how much profit a company makes from its net operating assets. Net operating assets are the assets that the company uses to run its business, such as inventory, equipment, and cash. Operating liabilities are the company's debts to run its business, such as accounts payable, wages, and taxes. To calculate net operating assets, you subtract operating liabilities from operating assets. Net operating profits are the company's operating earnings before paying taxes and interest. To calculate net operating profits, you subtract operating expenses from operating revenues. RNOA is the ratio of net operating profits to net operating assets. It shows how efficiently the company uses its net operating assets to generate income. A higher RNOA means the company is more profitable and productive. RNOA is formulated like this:

$$\text{RNOA} = \frac{\text{Net operating profits after taxes (NOPAT)}}{\text{Average Net Operating Assets (NOA)}}$$

NOA stands for net operating assets, a financial ratio that measures how efficiently a company uses its capital to generate profits. NOA is calculated by subtracting operating liabilities from operating assets. Operating assets are directly related to the company's core operations, such as inventory, accounts receivable, and fixed assets. Operating liabilities are part of the company's

day-to-day operations, such as accounts payable, accrued expenses, and deferred revenue. NOA can be expressed as:

$$\text{NOA} = \text{Operating Assets} - \text{Operating Liabilities}$$

2. Compute the NOPAT and RNOA (use ending NOA) using Summer Peeples, Inc.'s

financial data to calculate the first interest expense for NOPAT and RNOA:

Pretax profit	\$ 315,000.00
Interest expense	\$ 54,000.00
Operating profit	\$ 369,000.00
Tax rate	50%

$$\text{NOPAT} = \text{Operating profit} * (1 - \text{Tax Rate})$$

$$= \$369,000 * (1 - 50\%) = \$184,500$$

Subtracting the current liabilities (\$200,000.00) from the total assets (\$2,000,000.00) gives the NOA of \$1,800,000, the denominator below. These values are the same and operational for 2013 and 2014.

$$\text{RNOA} = \frac{\text{NOPAT}}{\text{Average NOA}}$$

$$\text{RNOA} = \frac{\$184,500}{\$1,800,000} = 10.25\%$$

3. This means that Summer Peeples's operating activities generated a return of 10.25% on the net operating assets in 2014. This is lower than the ROCE with leverage, which implies that leverage positively affects ROCE. To understand why, we need to disaggregate ROCE into the spread and the financial leverage. The spread is the difference between RNOA and the net borrowing cost (NBC), which is the ratio of net

financial expense (NFE) to net financial obligations (NFO) at \$675,000 and noncurrent liabilities. In this case, the net financial expenditure (NFE) is the interest expense times one minus the tax rate of \$27,000. Subramanyam (2014) shows that below the image contains terms and definitions.

Term	Definition
LEV (financial leverage)	Average NFO/Average equity
NFO (net financial obligations)	Interest-bearing liabilities less marketable securities and other nonoperating assets (or NOA – Equity)
Spread	RNOA–NFR
NFR (net financial rate)	NFE/Average NFO
NFE (net financial expense)	Interest expense less investment returns from nonoperating assets

Note: Image from Subramanyam, K.R., & Wild, J. (2007). Financial statement analysis (1st ed.). McGraw-Hill. McGraw-Hill Higher Education.pg.480.

Using the data for 2014, we can calculate NBC and the spread as follows:

$$NFE = \text{Interest expense} + (1 - \text{tax rate})$$

$$NFE = \$54,000 * (1 - 0.5) = \$27,000$$

$$NBC = \frac{NFE}{NFO} = \frac{\$27,000}{\$675,000} = 0.04$$

$$\text{Spread} = \text{RNOA} - \text{NBC} = 10.25\% - 4\% = 6.25\%$$

The spread measures the excess return on operating activities over the cost of borrowing.

The financial leverage is the ratio of NFO to common stockholders' equity, which measures the extent of debt financing. Using the data for 2014, we can calculate the financial leverage as follows:

$$\text{Financial Leverage} = \frac{NFE}{\text{Common Stockholders' Equity}} = \frac{\$675,000}{\$1,125,000} = 0.6$$

The financial leverage magnifies the effect of the spread on ROCE. The advanced DuPont model shows the relationship between ROCE, spread, and financial leverage as follows:

$$\text{ROCE} = \text{RNOA} + \text{Spread} * \text{Financial Leverage} = 10.25\% + 0.6 * 6.25\% = 14\%$$

The leverage effect is 3.75%, the difference between the ROCE of 14% and the RNOA of 10.25%. This means the firm increased its ROCE by issuing 8% bonds to finance its NOA.

References

Subramanyam, K.R., & Wild, J. (2007). *Financial statement analysis* (1st ed.). McGraw-Hill.

McGraw-Hill Higher Education.