

Horizontal and Vertical Analysis

Introduction

Financial statements play a central role in the analysis and valuation of a firm. Financial statement analysis is an exciting and rewarding activity, particularly when the objective is to assess whether the market is pricing a firm's shares fairly.

Security analysts are professionals whose primary objective is to value equity securities issued by firms. Security analysts collect and analyze a wide array of information from financial statements and other sources to evaluate a firm's current and past performance, predict its future performance, and then estimate the value of the firm's shares. Comparisons of thoughtful and intelligent estimates of the firm's share value with the market price for the shares provide the bases for making good investment decisions.

In addition to estimating firm value, you can apply the tools of effective financial statement analysis in many other important decision-making settings, including the following:

- Managing a firm and communicating results to investors, creditors, employees, and other stakeholders.
- Assigning credit ratings or extending short-term credit (for example, a bank loan used to finance accounts receivable or inventories) or long-term credit (for example, a bank loan or public bond issue used to finance the acquisition of property, plant, or equipment).
- Assessing the operating performance and financial health of a supplier, customer, competitor, or potential employer.
- Evaluating firms for potential acquisitions, mergers, or divestitures.
- Valuing the initial public offering of a firm's shares.
- Consulting with a firm and offering helpful strategic advice.

- Forming a judgment in a lawsuit about damages sustained.
- Assessing the extent of auditing needed to form an opinion about a client's financial statements.

Investors and creditors cannot evaluate a company by examining only one year's data. That is why most financial statements cover at least two periods.

To accurately determine the financial performance of a company, such as Smart Touch Learning, we need to compare its performance in the following ways:

- From year to year
- With a competing company
- With the same industry as a whole

After this comparison, we will have a better idea of how to judge the company's present situation and predict what might happen in the near future.

HOW DO WE USE HORIZONTAL ANALYSIS TO ANALYZE A BUSINESS?

Many decisions hinge on whether the numbers-sales, expenses, and net income, for example- are increasing or decreasing. For example, have sales and other revenues risen from last year? By how much?

Sales may have increased, but considered in isolation, this fact is not very helpful. The percentage change in sales over time is more relative and, therefore, more helpful. For example, if a company had sales of \$100,000 one year and sales increased by \$50,000 the next year, that would be a significant increase. However, if the company had sales of \$1 billion and sales increased by \$50,000 that would not be significant. Therefore, it is often more relevant to know the percentage increase than the dollar increase.

The study of percentage changes in line items from comparative financial statements is called horizontal analysis. Horizontal analysis compares the change in each financial statement item from one year to the next. Computing a percentage change in comparative statements requires two steps:

1. Compute the dollar amount of the change in a line item from the earlier period to the later period.
2. Divide the dollar amount of change by the earlier period amount, and multiply by 100.

We call the earlier period the base period.

Horizontal analysis is illustrated for Smart Touch Learning as:

Smart Touch Learning's net sales revenue increased by 6.8% during 2020, computed as follows:

	2020	2019	Amount	Percentage
Net Sales Revenue	\$858,000	\$803,000	\$55,000	6.8%

Step 1: Compute the dollar amount of change in sales from 2019 to 2020:

$$\begin{aligned}
 \text{Dollar amount of change} &= \text{Later period amount} - \text{Earlier period amount} \\
 &= \$858,000 - \$803,000 \\
 &= \$55,000
 \end{aligned}$$

Step 2: Divide the dollar amount of change by the base period amount and multiply by 100. This computes the percentage change for the period

$$\begin{aligned}
 \text{Horizontal analysis \%} &= (\text{Dollar amount of change} / \text{Base period amount}) \times 100 \\
 &= (\$55,000 / \$803,000) \times 100 \\
 &= 6.8\%*
 \end{aligned}$$

HORIZONTAL ANALYSIS OF THE INCOME STATEMENT

The horizontal analysis of Smart Touch Learning's income statement is shown below. This comparative income statement reveals a significant amount of growth during 2020. Net sales revenue increased by 6.8% while Cost of Goods Sold increased by only 0.8%, resulting in a 17.3% increase in gross profit. Additionally, Smart Touch Learning was able to control its operating expenses, creating a 77.2% growth in operating income.

Two items on Smart Touch Learning's income statement with the slowest growth rates are Cost of Goods Sold and Administrative Expenses. Cost of Goods Sold increased by only 0.8%, and



administrative expenses decreased by 4.1%. On the bottom line, net income grew by an incredible 84.6%. That is real progress!

SMART TOUCH LEARNING				
Income Statement				
Years Ended December 31, 2020 and 2019				
	2020	2019	Increase (Decrease)	
			Amount	Percentage
Net Sales Revenue	\$ 858,000	\$ 803,000	\$ 55,000	6.8%
Cost of Goods Sold	513,000	509,000	4,000	0.8
Gross Profit	345,000	294,000	51,000	17.3
Operating Expenses:				
Selling Expenses	126,000	114,000	12,000	10.5
Administrative Expenses	118,000	123,000	(5,000)	(4.1)
Total Operating Expenses	244,000	237,000	7,000	3.0
Operating Income	101,000	57,000	44,000	77.2
Other Income and (Expenses):				
Interest Revenue	4,000	0	4,000	—
Interest Expense	(24,000)	(14,000)	10,000	71.4
Total Other Income and (Expenses)	(20,000)	(14,000)	6,000	42.9
Income Before Income Taxes	81,000	43,000	38,000	88.4
Income Tax Expense	33,000	17,000	16,000	94.1
Net Income	\$ 48,000	\$ 26,000	\$ 22,000	84.6%

HORIZONTAL ANALYSIS OF THE BALANCE SHEET

Horizontal analysis of Smart Touch Learning's comparative balance sheet is shown in below. This analysis also shows growth in assets, with total assets increasing by 22.2%. Notice that both Cash and Cash Equivalents and Prepaid Expenses decreased during the year, but these decreases were offset by increases in other assets. Smart Touch Learning's total liabilities also grew. Total liabilities increased by 33.0% but notice that Accrued Liabilities decreased by 12.9%, as indicated by the percentage in parentheses. This is another indicator of positive growth for Smart Touch Learning because it implies the corporation is using debt to grow the company. Accrued liabilities actually decreased, as indicated by the liability figures in parentheses.

SMART TOUCH LEARNING Balance Sheet December 31, 2020 and 2019				
	2020	2019	Increase (Decrease)	
			Amount	Percentage
Assets				
Current Assets:				
Cash and Cash Equivalents	\$ 29,000	\$ 32,000	\$ (3,000)	(9.4)%
Accounts Receivable, Net	114,000	85,000	29,000	34.1
Merchandise Inventory	113,000	111,000	2,000	1.8
Prepaid Expenses	6,000	8,000	(2,000)	(25.0)
Total Current Assets	262,000	236,000	26,000	11.0
Property, Plant, and Equipment, Net	507,000	399,000	108,000	27.1
Long-term Investments	18,000	9,000	9,000	100.0
Total Assets	\$ 787,000	\$ 644,000	\$ 143,000	22.2%
Liabilities				
Current Liabilities:				
Accounts Payable	\$ 73,000	\$ 68,000	\$ 5,000	7.4%
Accrued Liabilities	27,000	31,000	(4,000)	(12.9)
Notes Payable	42,000	27,000	15,000	55.6
Total Current Liabilities	142,000	126,000	16,000	12.7
Long-term Liabilities	289,000	198,000	91,000	46.0
Total Liabilities	431,000	324,000	107,000	33.0

TREND ANALYSIS

Trend analysis is a form of horizontal analysis. Trend percentages indicate the direction a business is taking. For example, how have sales changed over a five-year period? What trend does net income show? These questions can be answered by trend analysis over a period, such as three to five years.

Trend analysis percentages are computed by selecting a base period (for example, the earliest year). The base period amounts are set equal to 100%. The amounts for each subsequent year are expressed as a percentage of the base amount. To compute trend analysis percentages, we divide each item for the following years by the base period amount and multiply by 100.



Assume Smart Touch Learning's Net Sales Revenue were \$750,000 in 2016 and rose to \$858,000 in 2020. To illustrate trend analysis, review the trend of net sales revenue during 2016-2020. The base year is 2016, the earliest year, so that year's percentage is set equal to 100

	2020	2019	2018	2017	2016
Net Sales Revenue	\$ 858,000	\$ 803,000	\$ 780,000	\$ 748,000	\$ 750,000
Trend Percentages	114.4%	107.1%	104.0%	99.7%	100.0%

We want percentages for the five-year period 2016-2020. We compute these by dividing each year's net sales revenue amount by the 2016 net sales revenue amount and multiply by 100. For example, the trend percentage for 2017 is calculated as follows:

$$\begin{aligned}
 \text{Trend \%} &= (\text{Any period amount} / \text{Base period amount}) \times 100 \\
 &= (\$748,000 / \$750,000) \times 100 \\
 &= 99.7\%
 \end{aligned}$$

Trend analysis and horizontal analysis are very similar, but they can be used to indicate different things for a company. Horizontal analysis allows a company to see the percentage change from one year to the next. Trend analysis shows the percentage change from a base year forward to determine whether the trend in net sales revenue, for example, is positive or negative over a longer period of time

Try It!

5. Freedom Corp. reported the following on its comparative income statement:

<i>(In millions)</i>	2019	2018
Net Sales Revenue	\$ 10,000	\$ 8,000
Cost of Goods Sold	4,500	3,000

Prepare a horizontal analysis of net sales revenue, cost of goods sold, and gross profit—both in dollar amounts and in percentages. Check your answers online in Pearson MyLab Accounting or at <http://www.pearsonglobaleditions.com/Sitemap/Horngren/>.

HOW DO WE USE VERTICAL ANALYSIS TO ANALYZE A BUSINESS?

As you have seen, horizontal analysis and trend analysis percentages highlight changes in an item from year to year, or over time. But no single technique gives a complete picture of a business, so we also need vertical analysis.

Vertical analysis of a financial statement shows the relationship of each item to its base amount, which is the 100% figure. Every other item on the statement is then reported as a percentage of that base. For the income statement, net sales revenue is the base. For the balance sheet, total assets is the base.

$$\text{Vertical analysis \%} = (\text{Specific item} / \text{Base amount}) \times 100$$

VERTICAL ANALYSIS OF THE INCOME STATEMENT

The vertical analysis percentage for Smart Touch Learning's cost of goods sold is 59.8% of net sales revenue $((\$513,000 / \$858,000) * 100 = 59.8\%)$ in 2020 and 63.4% $((\$509,000 / \$803,000) * 100 = 63.4\%)$ in 2019. This means that for every \$1 in net sales revenue, almost \$0.60 in 2020 and approximately \$0.63 in 2019 is spent on cost of goods sold. This percentage decrease in cost of goods sold helps explain the percentage increase in gross profit as calculated in the horizontal analysis. Smart

SMART TOUCH LEARNING				
Income Statement				
Years Ended December 31, 2020 and 2019				
	2020	Percent of Total	2019	Percent of Total
Net Sales Revenue	\$ 858,000	100.0%	\$ 803,000	100.0%
Cost of Goods Sold	513,000	59.8	509,000	63.4
Gross Profit	345,000	40.2	294,000	36.6
Operating Expenses:				
Selling Expenses	126,000	14.7	114,000	14.2
Administrative Expenses	118,000	13.8	123,000	15.3
Total Operating Expenses	244,000	28.4	237,000	29.5
Operating Income	101,000	11.8	57,000	7.1
Other Income and (Expenses):				
Interest Revenue	4,000	0.5	0	0.0
Interest Expense	(24,000)	(2.8)	(14,000)	(1.7)
Total Other Income and (Expenses)	(20,000)	(2.3)	(14,000)	(1.7)
Income Before Income Taxes	81,000	9.4	43,000	5.4
Income Tax Expense	33,000	3.8	17,000	2.1
Net Income	\$ 48,000	5.6%	\$ 26,000	3.2%

Touch Learning was able to decrease the cost of goods sold by more than \$0.03 for every \$1 of net sales revenue.

Smart Touch Learning's net income is 5.6% of net sales revenue in 2020 and 3.2% of net sales revenue in 2019. That improvement from 2019 to 2020 is extremely good. Suppose under normal conditions a company's net income is 10% of revenues. A drop to 4% may cause the investors to be alarmed and sell their stock.

VERTICAL ANALYSIS OF THE BALANCE SHEET

The base amount (100%) is total assets. The base amount is also total liabilities and stockholders' equity because they are exactly the same number (remember the accounting equation); in 2020, that's \$787,000.

SMART TOUCH LEARNING Balance Sheet December 31, 2020 and 2019				
	2020	Percent of Total	2019	Percent of Total
Assets				
Current Assets:				
Cash and Cash Equivalents	\$ 29,000	3.7%	\$ 32,000	5.0%
Accounts Receivable, Net	114,000	14.5	85,000	13.2
Merchandise Inventory	113,000	14.4	111,000	17.2
Prepaid Expenses	6,000	0.8	8,000	1.2
Total Current Assets	262,000	33.3	236,000	36.6
Property, Plant, and Equipment, Net	507,000	64.4	399,000	62.0
Long-term Investments	18,000	2.3	9,000	1.4
Total Assets	\$ 787,000	100.0%	\$ 644,000	100.0%
Liabilities				
Current Liabilities:				
Accounts Payable	\$ 73,000	9.3%	\$ 68,000	10.6%
Accrued Liabilities	27,000	3.4	31,000	4.8
Notes Payable	42,000	5.3	27,000	4.2
Total Current Liabilities	142,000	18.0	126,000	19.6
Long-term Liabilities	289,000	36.7	198,000	30.7
Total Liabilities	431,000	54.8	324,000	50.3
Stockholders' Equity				
Common Stock, no par	186,000	23.6	186,000	28.9
Retained Earnings	170,000	21.6	134,000	20.8
Total Stockholders' Equity	356,000	45.2	320,000	49.7
Total Liabilities and Stockholders' Equity	\$ 787,000	100.0%	\$ 644,000	100.0%

The vertical analysis of Smart Touch Learning's balance sheet reveals several interesting things:

- Current assets make up 33.3% of total assets in 2020 and 36.6% of total assets in 2019. This is typical for most companies with current assets representing close to 30% of total assets.
- Total liabilities are 54.8% of total assets in 2020, increasing slightly from 2019, 50.3%.
- Stockholders' equity makes up 45.2% of total assets in 2020 and 49.7% of total assets in 2019. The percentage share of total assets was nearly equally distributed between total liabilities and total equity for both years.

COMMON-SIZE STATEMENTS

Horizontal analysis and vertical analysis provide much useful data about a company. As we have seen, Smart Touch Learning's percentages depict a very successful company. But the data apply only to one business.

To compare Smart Touch Learning to another company, we can use a common-size statement. A common-size statement reports only percentages—the same percentages that appear in a vertical analysis. By only reporting percentages, it removes dollar value bias when comparing one company to another company. Dollar value bias is the bias one sees from comparing numbers in absolute (dollars) rather than relative (percentage) terms. For us, \$1 million seems like a large number. For some large companies, it is immaterial.

We could prepare common-size statements for Smart Touch Learning from year to year; however, we will start by preparing common-size income statements for Smart Touch Learning and Learning School, another fictitious company, both of which compete in the same industry. Which company earns a higher percentage of revenues as profits for its shareholders? Exhibit 15-5 gives both companies' common-size income statements for 2020 so that we can compare them on a relative, not absolute, basis.

SMART TOUCH LEARNING Versus LEARNING SCHOOL Common-Size Income Statement Year Ended December 31, 2020		
	Smart Touch Learning	Learning School
Net Sales Revenue	100.0%	100.0%
Cost of Goods Sold	59.8	36.3
Gross Profit	40.2	63.7
Operating Expenses:		
Selling Expenses	14.7	21.8
Administrative Expenses	13.8	7.3
Total Operating Expenses	28.4	29.1
Operating Income	11.8	34.6

Learning School was more profitable than Smart Touch Learning in 2020. Learning School's gross profit percentage is 63.7%, compared with Smart Touch

Learning's 40.2%. This means that Learning School is earning more gross profit from every dollar of revenue than Smart Touch Learning is earning. And, most importantly, Learning School's percentage of net income to revenues is 23.5%. That means almost one-fourth of

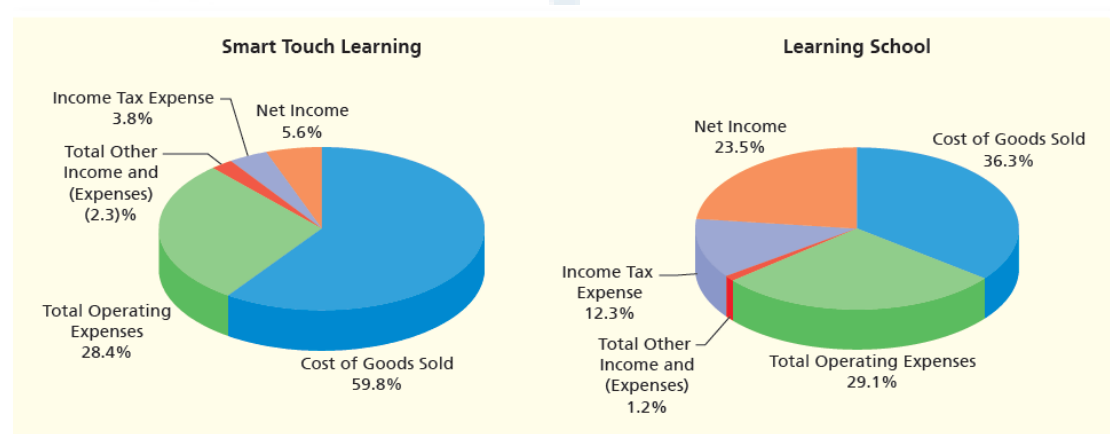
Learning School's revenues result in profits for the company's stockholders.

Benchmarking

Benchmarking is the practice of comparing a company's performance with best practices from other companies. It often uses the common-size percentages in a graphical manner to highlight differences. There are two main types of benchmarks in financial statement analysis: benchmarking against a key competitor and benchmarking against the industry average.

Benchmarking Against a Key Competitor

Exhibit 15-5 uses a key competitor, Learning School, to compare Smart Touch Learning's profitability. The two companies compete in the same industry, so Learning School serves as an ideal benchmark for Smart Touch Learning. The charts in Exhibit 15-6 highlight the profitability difference between the companies. Focus on the segments of the graphs showing cost of goods sold and net income. Learning School is clearly more profitable than Smart Touch Learning, primarily because its cost of goods sold is significantly lower.



Benchmarking Against the Industry Average

The industry average can also serve as a very useful benchmark for evaluating a company.

An industry comparison would show how Smart Touch Learning is performing alongside the average for the e-learning industry.

TRY IT!

6. Monroe Corp. reported the following amounts on its balance sheet at December 31, 2018 and 2017:

	2018	2017
Cash and Receivables	\$ 35,000	\$ 40,000
Merchandise Inventory	20,000	15,000
Property, Plant, and Equipment, Net	80,000	60,000
Total Assets	<u>\$ 135,000</u>	<u>\$ 115,000</u>

Prepare a vertical analysis of Monroe Corp. for 2018 and 2017.

Check your answers online in Pearson MyLab Accounting or at <http://www.pearsonglobaleditions.com/Sitemap/Horngren/>.