**Financial Statement Analysis**

**Learning Outcomes**

After completing this module, students will be able to:

1. Evaluate a firm's financial performance using traditional liquidity, asset management, long-term debt-paying ability, profitability, and market valuation ratios.
2. Evaluate a firm's financial performance using a five-way analysis of return on equity and segmented reporting.
3. Evaluate a firm’s financial performance using vertical and horizontal analysis of common-sized financial statements.
4. Evaluate a firm’s financial performance using cash flow-based financial ratios and cash flow statement analysis.
5. Recommend actions to address performance issues identified when analyzing a company’s financial statements.
6. Demonstrate how trend analysis and industry average ratios are effectively employed when analyzing a company's financial performance.
7. Describe the accounting and statistical limitations of financial statement analysis.

**Introduction**

One of the most critical skills a manager learns is analyzing a company’s financial statements. Problems such as rising labour costs, slow-moving products, or excessive borrowing can quickly jeopardize a company if not addressed.

Financial statement analysis only helps to identify problems. Managers must then utilize their interpersonal skills and knowledge of other business disciplines, such as marketing or supply chain management, to develop and implement effective solutions. Rising labour costs can be addressed by outsourcing production to low-wage countries. Slow-moving inventory can be quickly cleared through sales promotions or by hiring a new purchasing manager to better identify consumer trends. Excessive borrowing can be addressed by reducing dividends or slowing rapid growth to a more sustainable pace.

Financial statement analysis is not only crucial to accountants and finance specialists. Individual investors, professional analysts, and portfolio managers utilize financial statement analysis to inform their investment decisions, whether to buy or sell directly or recommend to their clients. Creditors, such as banks or leasing companies, use financial statements to assess a lending prospect’s creditworthiness and then monitor the performance of their loans on an ongoing basis. Regulators use financial statement analysis to set prices, ensuring that firms in regulated industries earn a fair return without exploiting consumers. Governments use financial statement analysis to monitor the health of an industry and implement national industrial policies. Unions use financial statements to ascertain the additional salary and benefits that employers can afford to give their workers during labour negotiations, or the concessions employees must make in a declining industry. Finally, social activists use financial statement analysis to determine if a company’s prices are excessive, if sensitive resource projects are viable, or if resources are available for environmental protection initiatives.

* 1. **| Financial Statement Analysis Tools**

Managers use an assortment of tools to analyze a company’s financial statements. The information provided by one technique often duplicates that of another, but all should be combined to produce the most thorough analysis possible. The tools include:

**Ratio analysis.** Traditional financial ratios compare different components of a company’s income statement or balance sheet to measure its performance. Liquidity ratios gauge whether a company has sufficient cash and other liquid assets to pay its current liabilities. The asset management or activity ratios indicate how efficiently a company is utilizing its inventory, accounts receivable, and fixed assets. Long-term debt-paying ability or solvency ratios determine whether a company is over- or under-borrowed and whether it can service its debt. Profitability ratios compare a company’s profits to its sales or the shareholders’ investment. Market valuation ratios determine if a company’s common shares are fairly valued. Cash flow-based financial ratios complement traditional financial ratios by substituting cash flow from operations for accounting income, as it is less sensitive to accounting manipulation and better able to detect liquidity and solvency problems.

**Vertical analysis.** All accounts are expressed as a percentage of net sales on the income and cash flow statements, and as a percentage of total assets on the balance sheet, each year. These ratios supplement the traditional financial ratios by providing greater detail.

**Horizontal analysis.** All accounts are expressed as a percentage of themselves in a common base year, producing a growth rate for each item over a specific period. These growth rates are then compared to the growth rate of sales or total assets to identify significant trends.

**Cash flow statement analysis.** A company’s cash flow statement is divided into cash flow from operations (CFO), cash flow from investing (CFI), and cash flow from financing (CFF). Typically, a successful company’s CFO is positive. The CFO is usually insufficient to cover all capital expenditures in CFI, so additional financing is raised in CFF. Most companies aim to maintain a stable cash balance, so the CFO, CFI, and CFF typically net to zero, resulting in a cash balance that remains unchanged from the beginning to the end of the year. This is generally the case, but companies are often compelled to borrow heavily to compensate for poor operating results, large inventory buildups, slow collections, or costly business expansions. Managers can quickly identify cash flow problems and their causes by carefully examining the cash flow statement.

Financial statement analysis is most valuable when an analyst examines a company’s financial statements and ratios over a specific period to identify significant trends. These ratios should also be benchmarked against industry averages or those of comparable companies to determine how the firm performs relative to its competitors.

**1.2 | Liquidity**

The long-term goal of most companies is to earn a fair return for their shareholders. But their focus in the short term is to remain liquid so they can pay their expenses on time. Liquid means a firm’s assets can be quickly and cheaply converted into cash without having to accept less than their fair market value; any asset can be sold quickly if the owner offers a large enough price discount. Even companies with excellent long-term prospects may experience financial distress or even go bankrupt if they do not carefully monitor their liquidity.

Liquidity ratios compare a firm’s liquid assets to its short-term obligations. They are essential to creditors such as bankers or suppliers, or when analyzing cyclical companies with variable cash flows that are difficult to predict. Companies do not want their liquidity reserve, which is the difference between their liquid assets and short-term obligations, to become too small, risking bankruptcy. Nor do they want it to become too large, as holding excess liquid assets, such as cash and short-term investments, is expensive. An optimal liquidity ratio strikes a balance between these two costs.

It is helpful to study trends and industry averages for the different liquidity ratios, but remember that the averages are only approximations. Ratios vary significantly among firms in the same industry, depending on how well they are managed and their different working capital management practices.

**Current ratio.**  This ratio measures a company’s ability to satisfy its current liabilities with its current assets if it is forced to liquidate.

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

Current assets are convertible into cash within a year and consist primarily of cash and cash equivalents, short-term investments, accounts receivable, and inventory. Current liabilities are due within a year and consist principally of accounts payable, short-term bank borrowing, wages payable, taxes payable, the current portion of long-term debt, and other accrued liabilities. Logically, the current ratio should be at least 1.0; however, most firms maintain a higher ratio, such as 1.5 or 2.0, as a liquidity reserve against unexpected cash flow fluctuations.

A common fallacy in finance is that a firm’s current ratio should always be above 1.0, but it depends on its net operating cycle. The net operating cycle is the time from when a company invests cash in new inventory to when it recovers its cash after collecting accounts receivable. The longer a firm’s net operating cycle, the higher its current ratio. For companies that sell their inventory quickly for cash and receive generous trade credit from suppliers, their net operating cycle will be negative, resulting in a current ratio of less than 1.0. Most firms have current ratios above 1.0, but there are significant differences between industries.

Most lenders require firms to maintain a current ratio above a specific level as a condition of the loan. If a company is having difficulty meeting this requirement, it may resort to a type of financial manipulation called “window dressing.” The current ratio can be increased by reducing the numerator and denominator of the current ratio formula by the same amount if the ratio is above 1.0. If the ratio is below 1.0, the opposite is true. The standard practice is to first increase cash by accelerating accounts receivable collections using early payment discounts, selling receivables early to a factor or standalone sales finance company, or temporarily reducing inventory balances. These actions do not reduce current assets; instead, they convert accounts receivable and inventory into cash. To reduce both the numerator and denominator, the money generated is used to pay down accounts payable, short-term borrowing, or other current liabilities, thereby increasing the current ratio.

Companies typically select their year-ends at their seasonal low point, when cash balances are high and inventory, accounts receivable, and accounts payable are at their lowest levels. The current ratio is likely to be overstated at year-end, so analysts should examine it at different times throughout the year, especially during the seasonal high when liquidity problems are more prevalent. Also, a current ratio may be high, but if accounts receivable are past due, inventory is slow-moving, obsolete, or damaged, or cash is subject to restrictions that prevent it from being used to settle liabilities within the next 12 months. The firm’s liquidity will be overstated. For example, banks frequently require companies to maintain a minimum cash balance as a condition of a loan, ensuring they have sufficient funds to make their next payment and are not left unable to pay other liabilities.

**Quick ratio or acid test.** This ratio measures a firm’s ability to satisfy its current liabilities using its more liquid assets and is thus more conservative than the current ratio.

$$Quick ratio= \frac{Cash and cash equivalents+Short–term investments+Accounts receivable}{Current liabilities}$$

Cash can be used to pay obligations immediately, while cash equivalents are safe, highly liquid debt securities such as bank deposits or treasury bills that mature in under three months. Short-term investments are similar, but they mature in three to 12 months. Accounts receivable are legally enforceable contracts for sales. Some accounts receivable may need to be written off or collection delayed, especially during an economic downturn; however, most cash payments are received on time.

Inventory is not included in the quick ratio as its value is only realized if it is sold. This may be particularly challenging during a recession if the inventory is slow-moving, obsolete, or damaged, or if the company is bankrupt. Inventory is the most illiquid of all current assets, mainly when it consists of raw materials and work-in-progress rather than finished goods. Both raw materials and finished goods inventories are ready for sale, but raw material prices can fluctuate significantly in the short term. Work-in-progress must be completed before it can be sold. If the quick ratio is less than 1.0, the company is dependent on its inventory to pay its short-term obligations, which exposes its creditors to greater risk.

**Cash ratio.** This ratio measures a company’s ability to satisfy its current liabilities with its most liquid assets, excluding both inventory and accounts receivable. It is even more conservative than the quick ratio and is used by a firm’s short-term creditors.

$$Cash ratio= \frac{Cash and cash equivalents+Short–term investments}{Current liabilities}$$

Having a high cash ratio is less important if the company has a committed operating line of credit that has not reached its borrowing limit. Many companies maintain large cash reserves, claiming they are for future business acquisitions or contingencies, but the CEO is usually being overly cautious. Excess cash should be paid out as dividends, allowing shareholders to find more profitable investments and avoid being hoarded in short-term deposits earning low returns.

**Net working capital to total assets ratio.**  Net working capital is the difference between current assets and current liabilities, or a company’s liquidity reserve. As this reserve grows as a percentage of total assets, it provides greater assurance to a firm’s creditors.

$$Net working capital=Current assets-Current liabilities$$

$$Net working capital to total assets ratio= \frac{Net working capital}{Total assets}$$

Besides traditional financial ratios, the cash flow statement also provides valuable insights into a firm’s liquidity, as does the cash budget in the annual master budget. The cash budget is especially valuable as it supplies forward-looking information, while the financial ratios and cash flow statement only summarize historical data. Cash flow statement analysis is examined later in this module. Preparing and analyzing a cash budget is illustrated in the Module: Financial Planning and Growth.

**1.3 | Asset Management**

Asset management ratios, also known as turnover or activity ratios, measure a company's efficiency in utilizing its current and long-term assets. The reason for holding inventory, extending trade credit, or purchasing property, plant, and equipment is to generate sales and earn a profit. The quicker a business turns over its assets, the more it will earn. Large amounts of equity and borrowed funds are needed to finance current and long-term assets. This places a tremendous burden on companies, putting them at constant risk of bankruptcy if sales do not materialize; therefore, companies must manage their assets efficiently.

Most asset turnover ratios relate a company’s sales to the value of its total assets or a specific asset category, such as inventory or fixed assets. A turnover ratio of 5.0 means a company is generating CAD 5.00 in sales each period for a CAD 1.00 investment in assets. Generally, the higher the asset turnover ratio, the better. However, sometimes a rising turnover ratio is the result of short-sighted decision-making, such as lowering prices to meet sales quotas or carrying less inventory to conserve cash, which can reduce the firm’s profitability in the long term. The goal is to find the optimal turnover ratio that maximizes a firm’s profits. As with liquidity ratios, it is helpful to study trends and industry averages for the different asset management ratios; however, these averages are only approximations.

**Inventory turnover.** This ratio indicates how quickly a company is selling its inventory and can be expressed as either a ratio or in days.

$$Inventory turnover= \frac{Cost of sales}{Average inventories}$$

$$Inventory turnover in days= \frac{365}{Inventory turnover}$$

To better understand what the inventory turnover ratio means, imagine a company with CAD 5,000 of inventory. The stock is held in the warehouse but is then sold all at once and immediately replaced. If this scenario continues, inventory will average CAD 5,000 over the year. Each time the inventory is sold, CAD 5,000 is added to the cost of sales. At the end of the year, the cost of sales divided by average inventory equals the number of times the inventory is sold or turned over each year. To make the inventory turnover ratio more understandable to users, it can be expressed in terms of 365 days per year, indicating how many days it takes to sell the stock. The inventory turnover in days is also referred to as the days of sales in inventory or inventory period.

The cost of sales is used instead of net sales because inventories are typically recorded at historical cost, rather than fair market value. If net sales are used, the ratio would be overstated, although some users prefer knowing the sales generated per dollar of inventory. It is also essential to use average inventory for seasonal businesses. Most companies choose their seasonal low as their year-end, as they have more time to complete their annual report and less inventory to count. If the inventory turnover ratio is calculated using a low year-end inventory, the ratio will be overstated again. Average monthly inventory balances are preferred, but quarterly averages are often used, as they are available in the company’s interim financial statements, issued quarterly. Many financial information providers only supply industry average ratios that use the year-end inventory or the average of this year’s and last year’s year-end inventory, so analysts should ensure ratios are calculated the same way before making comparisons. Averaging this year’s and previous year’s inventory accounts for the growth or decline in inventory over the year, but it does not include seasonal variations. If a company is experiencing rapid growth or a significant decline in its business, using year-end inventory will provide a more up-to-date turnover ratio. Merchandising businesses typically have only one type of inventory. In contrast, manufacturers calculate turnover ratios separately for their raw materials, work-in-progress, and finished goods inventories to better monitor their operations.

Managers need to know more than whether their inventory turnover in days is rising or falling over time, or whether it is above or below the industry average. They must also understand why this is occurring so they can take appropriate action.

Why might inventory turnover in days decrease?

* Adoption of just-in-time inventory and production practices
* Lower input costs and improved manufacturing methods
* Improved e-commerce presence
* Faster order processing and distribution
* Greater product selection, lower prices, more generous credit terms, or free shipping
* Better product quality, customer service, and business location
* Change in sales mix towards faster-selling items
* Lower purchases due to product shortages or insufficient cash and trade credit

Why might inventory turnover in days increase?

* Large batch production
* Higher input costs and inefficient manufacturing or distribution
* Weaker demand caused by an economic recession, increased competition, or changing consumer tastes
* Higher sales prices or less generous credit terms
* Lack of selection, low quality, poor service, overstocking, or obsolete products
* Change in sales mix towards slower-selling items
* A buildup in inventory to cope with high seasonal demand, expected work stoppages, potential inventory shortages, or a significant new sales contract
* Taking advantage of quantity discounts by buying in bulk
* Pressure from suppliers to buy more inventory at year-end to meet their sales quotas

Surplus inventories have several adverse effects, including increased storage and financing costs, employee layoffs resulting from production cuts, and lower profit margins as prices are reduced to clear excess stock. Review the quality of excess inventory, as fashion items, special components, and perishables such as food are harder to sell. Raw materials and finished goods are much easier to sell than WIP.

**Accounts receivable turnover.** This ratio indicates how quickly a company is collecting its accounts receivable and can be expressed as either a ratio or in days. In days form, it is also referred to as the days of sales outstanding or the average collection period.

$$Accounts receivable turnover= \frac{Net sales}{Average accounts receivable}$$

$$Accounts receivable turnover in days= \frac{365}{Accounts receivable turnover}$$

Sales are either net credit sales or net sales, which include both credit and cash transactions. If cash sales are included, the accounts receivable turnover in days is not comparable to the company’s credit terms. For example, if a firm’s credit terms are net 30 or 2/10, net 30, the accounts receivable turnover in days should approximate 30 days or 10 days. If it is higher, the company is likely experiencing collection problems. It is unlikely to be lower than 30 days or 10 days, as customers typically take as long as possible before making a payment. Like inventory turnover in days, an average of monthly or quarterly accounts receivable should be used instead of the year-end balance, so the ratio reflects seasonal variations.

Managers need to know more than whether their accounts receivable turnover in days is rising or falling over time, or whether it is above or below the industry average. They must also understand why this is occurring so they can take appropriate action.

Why might accounts receivable turnover in days increase?

* A national or local recession that reduces customers’ ability to pay
* Increase in credit sales at year-end to help meet sales quotas
* Offering more generous credit terms to increase sales or match those of a competitor
* Change in sales mix towards products with longer credit terms
* Poor credit approval, monitoring, and collections processes

Why might accounts receivable turnover in days decrease?

* An economic expansion increases the customers’ ability to pay
* Less generous credit terms to increase profits
* Change in sales mix towards products with shorter credit terms
* Improved credit approval, monitoring, and collections processes
* Offering early payment discounts such as 2/10, net 30
* Faster electronic payment practices
* Increased factoring

In addition to monitoring accounts receivable turnover in days, analysts should assess the quality of a firm’s receivables by reviewing customer credit ratings and preparing an account aging report. They should also look for a lack of diversification with sales focused on too few customers, a limited number of geographical regions, or a single industry. This sales breakdown must be disclosed under International Financial Reporting Standards (IFRS).

**Accounts payable turnover.** This ratio measures the time elapsed between when a company buys and when it pays for its inventory, and can be expressed as a ratio or in days. Suppliers typically extend trade credit to boost sales and provide customers with necessary financing until they can sell the product.

$$Accounts payable turnover= \frac{Purchases}{Average accounts payable}$$

$$Accounts payable turnover in days= \frac{365}{Accounts payable turnover}$$

Purchases should be used instead of the cost of sales, as accounts payable result from inventory purchases and not the sale of stock. Some analysts use the cost of sales as it is readily available in a company’s financial statements, but purchases can be calculated using the formula:

Cost of sales = Purchases + Beginning inventory - Ending inventory

Most inventory purchases are made on credit, so the accounts payable turnover in days should approximate suppliers’ credit terms, such as net 60 days. Due to competition, suppliers in the same industry usually offer similar terms. Companies may take longer to pay than the prescribed terms because of a cash shortage. “Stretching” accounts payable is not recommended as a firm could be placed on cash on delivery (COD) or cash before delivery (CBD) and have its credit rating reduced. Interest is also usually charged on overdue accounts. Companies will not pay sooner than the prescribed terms as they want to take maximum advantage of the interest-free trade credit. The only exception is if an early payment discount is offered, such as 3/15, net 60. Here, companies will likely pay early on the 15th day to receive the 3.0% discount.

**Operating and net operating cycle.**  The operating cycle is the number of days it takes a company to purchase inventory, sell the product, and collect the amount owed. For example, if a company buys inventory for CAD 10, waits 20 days before selling it on credit for CAD 15, and then collects the amount owed in 30 days, its operating cycle is 50 days. This is the time it takes to convert inventory back into cash and realize the CAD 5 return.

$$Operating cycle= Inventory turnover in days+Accounts receivable turnover in days$$

Businesses monitor their operating cycle very carefully, as a shorter cycle means they will realize the profit more often. This measure is imprecise because it does not account for the time given by suppliers to the company to settle purchases. The net operating cycle, also known as the cash conversion cycle, subtracts accounts payable turnover in days from inventory turnover in days to measure the time more accurately from when the company invests cash to when it is paid.

$$Net operating cycle=Inventory turnover in days-Accounts payable turnover in days+Accounts receivable turnover in days$$

**Net working capital turnover.** This ratio measures the sales a firm generates for each dollar invested in net working capital. Net working capital is the difference between current assets and current liabilities and is typically viewed as a separate asset class. When companies purchase current assets, they receive financing in the form of accounts payable and short-term bank loans, which reduces the net investment required.

$$Net working capital turnover= \frac{Net sales}{Average net working capital}$$

Some businesses, such as airlines, invest little in net working capital, while for others like retailers, it is their largest asset class. Net working capital turnover measures the turnover of inventory, accounts receivable, and accounts payable together, but also includes other asset groups, such as cash and cash equivalents, and short-term investments. Analysts typically measure the efficiency of each asset class separately, but may choose to study their combined effect using the net working capital turnover ratio.

**Fixed assets turnover.** This ratio measures the sales a company generates for each dollar invested in fixed assets.

$$Fixed assets turnover= \frac{Net sales}{Average fixed assets}$$

This is an essential ratio for capital-intensive companies, such as railways or airlines. The addition of new property, plant, and equipment is likely to result in a short-term decline in turnover, as it takes time to generate additional sales using these new assets. Managers often say that “sales lag expenditures.” Companies that are more capital-intensive or have younger assets with higher book values will also have lower ratios compared to other firms.

**Total assets turnover.**  This ratio combines the effects of the net working capital and fixed assets turnover ratios by using total assets as a basis.

$$Total assets turnover= \frac{Net sales}{Average total assets}$$

This ratio is vital for companies, such as manufacturers, that have significant investments in both net working capital and fixed assets. It is also used as an input in other ratios because it measures the overall efficiency of the firm.

Liquidity and asset management ratios are very interdependent. Declining turnover results in lower sales or higher asset balances, which can reduce cash and potentially lead to liquidity issues. The inventory, accounts receivable, and accounts payable turnover ratios are frequently classified as liquidity ratios by financial information providers.

**1.4 | Long-term Debt Paying Ability**

Business risk is the variability of a company’s operating profits or earnings before interest and taxes (EBIT), which is determined by its sales risk and operating risk. Sales risk increases as businesses become more cyclical and experience greater industry competition and technological change. Operating risk increases as a firm uses more operating leverage and the variability of its input prices rises. Operating leverage refers to the level of fixed costs within a company’s cost structure. Higher fixed costs lead to greater variability in EBIT, as these costs remain constant regardless of the sales volume.

A firm’s business risk is the primary determinant of its optimal capital structure or level of borrowing. Firms prefer to finance their operations using debt because of its low after-tax cost. However, they are unlikely to borrow more if they already have a high business risk, as the variability of EBIT will put them at risk of being unable to service their debt. Firms with high business risk tend to borrow less on average than firms with low business risk.

The long-term debt-paying ability or solvency ratios measure a firm’s level of borrowing and are divided into coverage and leverage ratios. Coverage ratios measure a company’s ability to service its debt, while leverage ratios show how dependent it is on debt financing. Higher coverage ratios and lower leverage ratios are beneficial for a company’s creditors. However, the firm does not want to be debt-free, as using a reasonable amount of borrowing can increase its return on equity (ROE). Determining a firm’s optimal capital structure is discussed later in this module and in the Module: Optimal Capital Structure.

**Coverage Ratios**

**Times interest earned.** This ratio, also known as the interest coverage ratio, represents the number of times a firm can cover its interest expense using EBIT. A high ratio means it can easily pay its interest and can take on additional debt.

$$Times interest earned= \frac{EBIT}{Interest expense}$$

The times interest earned ratio is problematic as EBIT is an accounting figure that can be manipulated by adopting different accounting policies and practices. EBIT also includes non-cash expenses, particularly depreciation and amortization, which can result in an understatement of the operating cash flow available to pay interest costs. Some companies use earnings before interest, taxes, depreciation, and amortization (EBITDA) instead of EBIT to address this issue, but another problem is that many financing charges, besides interest, are also ignored. Despite these problems, times interest earned is the most popular coverage ratio, and it is frequently included as a loan condition. Borrowers must maintain their times interest earned ratio above a prescribed level, or the lending institution can call in their loans, which means they demand immediate repayment of all outstanding interest and principal.

**Fixed-charge coverage ratio.** This ratio improves the times interest earned ratio by using EBITDA instead of EBIT and including other required financing payments.

$$Fixed-charge coverage ratio= \frac{EBITDA+Lease expense}{Lease expense+Interest expense+ \frac{Preferred dividends }{(1-t)}+ \frac{Principal Payments}{(1-t)}}$$

If a company does not make the required interest and principal payments on its loans, it will be declared bankrupt. Additionally, firms often rely heavily on leasing as an alternative to purchasing assets using commercial loans. If they fail to make these payments, the leased assets will be repossessed, which could lead to the businesses' failure. In financial statement analysis, preferred shares are equivalent to debt as investors in these securities do not vote, receive regular fixed payments only, and are not entitled to a portion of the firm’s residual income like debt holders. Companies can delay preferred dividend payments without being declared bankrupt; however, the stock market impact is so severe that most take every measure possible to avoid it. Additionally, when preferred share dividends are in arrears, preferred shareholders can vote alongside common shareholders at investor meetings. They are likely to be very vocal, so firms desperately try to pay their preferred dividends on time. As a result, preferred dividends are treated as required payments, similar to interest, principal, and lease obligations. The preferred dividends and principal payments are divided by (1–t) because they are not tax-deductible expenses, so they must be paid in after-tax dollars. This means companies must earn the necessary funds, pay taxes, and use the residual to pay them.

(Pre-tax income) (1–t) = After-tax preferred dividend or principal payment

Pre-tax income = $\frac{After–tax preferred dividend or principal payment}{(1-t)}$

If a company is experiencing financial difficulties, it will likely not pay taxes; therefore, the (1–t) should be removed.

**Leverage Ratios**

**Debt ratio.** This ratio measures what portion of a firm’s total assets is financed with debt. Companies with high debt ratios are susceptible to economic downturns because they must continue to make high fixed interest and principal payments despite declining cash flows.

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

The debt ratio is also problematic, as total debt is defined differently. Some analysts use total assets minus total equity, so it includes all debt obligations. Others subtract current liabilities, such as accounts payable, short-term borrowing, wages payable, taxes payable, and other accrued liabilities, but leave in the current portion of long-term debt. These amounts are excluded because they relate to the day-to-day operation of the business and vary significantly throughout the year. Total debt will include all interest-bearing long-term debt, as well as other long-term obligations, such as future income taxes and defined benefit pension liabilities. Whatever definition is chosen, analysts must ensure the same method is used when comparing ratios from different sources.

**Debt-to-equity ratio.** This ratio expresses total debt as a multiple of total equity. A higher multiple indicates that a firm is more reliant on debt financing, so creditors assume a greater risk.

$$Debt–to–equity ratio= \frac{Total debt}{Total equity }$$

Total debt and total equity are usually calculated using book values. Tangible net worth is sometimes used as a substitute for total equity. Tangible net worth is a firm’s total equity minus its intangible assets and goodwill. Given the questionable value of these types of assets, this adjustment to equity results in a more conservative debt-to-equity ratio.

Some analysts feel that using book value overstates the debt-to-equity ratio because, while the book value of total debt typically approximates its market value, the market value of equity is usually considerably higher than its book value. In practice, conservative lenders typically require the use of book value for both debt and equity; however, researchers and financial information providers often employ the book value of debt and the market value of equity. They also classify preferred shares as debt using their book value.

**Long-term debt to total capitalization ratio.** This ratio measures what portion of a firm’s total capitalization is long-term debt.

$$Long–term debt to total capitalization ratio= \frac{Long–term debt}{Long–term debt+Total equity}$$

Total capitalization is the long-term debt and equity financing specifically raised to finance a company. Long-term debt includes only interest-bearing long-term liabilities, plus the current portion of long-term debt. Short-term bank borrowing and other current and long-term liabilities, like future income taxes or pension liabilities, are excluded.

Financial information providers prefer the long-term debt to total capital ratio because total capitalization is specifically raised to finance the business over the long term. Interest-bearing debt is the riskiest form of funding, as non-payment quickly leads to bankruptcy. Short-term bank borrowing is typically temporary and varies significantly throughout the year due to seasonal fluctuations. Future income tax and pension liabilities are expected to decline to zero in the long term as temporary differences are reversed and pensions become fully funded.

In addition to examining leverage and coverage ratios to determine if a company is over- or under-borrowing or having difficulty servicing its debt, analysts must find answers to several other important questions.

1. Is the company defaulting on any interest or principal requirements or violating any other loan conditions?
2. Do any of the loan conditions designed to conserve cash for debt servicing and protect loan collateral place operational limitations on the company?
* The current ratio, net working capital, or other ratio requirements
* Restrictions on share repurchases or dividend payments
* Restrictions on the acquisition of new fixed assets
* Restrictions on the issuance of new debt
* Restrictions on sale or sale/leaseback of assets
1. What is the maturity structure of the company’s long-term debts? Are they due soon? Are there any large loan “balloon” payments due shortly?
2. Is short-term borrowing non-committed or committed?
3. Are defined benefit pension and healthcare plans underfunded? Are liabilities increasing rapidly due to rising benefit costs? Are the company’s actuarial assumptions unreasonable, indicating that the liability is understated?
4. Are floating interest rates and foreign currency loans properly hedged, or is the company exposed to fluctuating interest and exchange rates?
5. Are there any convertible debts that will be turned into equity soon, avoiding further payments?

Other factors may indicate better long-term debt-paying ability than a firm’s coverage and leverage ratios support. These include:

* + - Unused borrowing capacity on existing loan agreements
		- Unpledged assets that can be used as collateral for new loans
		- Highly marketable financial and fixed assets that can be quickly liquidated if needed
		- Access to the public debt and equity markets as a publicly traded company
		- A strong credit rating that makes it easier to negotiate new financing
		- Parent company that can provide loan guarantees and direct financing
* Strong track record of profitability that attracts new lenders
* Operating in a stable industry where companies are not prone to financial distress
* A large company with significant market power when dealing with lenders and suppliers
* High level of discretionary expenses, such as marketing, training, or advertising, that can be reduced if funds are required
* Lower business risk due to lower operating leverage, allowing more borrowing
* Reduced exposure to strikes or other potential supply problems

Module: Maturity Matching and Module: Permanent Debt and Equity Financing examine the commercial lending process in detail.

**1.5 | Profitability**

A firm’s profitability is measured relative to its sales and the shareholders’ investment in the business. Measuring profitability from both these perspectives is essential. For example, a company may be able to earn a CAD 60 million profit on sales of CAD 2 billion, representing a 3.0% profit margin relative to sales. However, if shareholders had to invest CAD 20 billion, this would yield only a 0.3% return on investment. Given that riskless investments, such as government bonds, pay approximately 3.0% over the long term, this return is insufficient to attract investors. Making a profit relative to sales is not enough unless investors also earn a fair return on their investment.

Potential businesses should not be discouraged by companies with low profitability relative to sales. A firm may only earn a few cents on every sales dollar, but if this is combined with high asset turnover, it will magnify these profits many times. Food and discount department stores have very low profits relative to sales, but they also turn over their stock very quickly. Women’s clothing retailers have high profits relative to sales, but it takes them much longer to turn over their stock. Profitability relative to sales and asset turnover must always be considered together. A low-price and high-turnover strategy versus a high-price and low-turnover strategy may generate the same profits and return on investment for shareholders.

**Relative to Sales**

**Gross profit margin.** This ratio measures a company’s profitability as a percentage of net sales after the cost of sales.

$$Gross profit margin= \frac{Gross profit}{Net sales}$$

The cost of sales includes the cost of resold inventory for a merchandising business, as well as direct materials, direct labour, and manufacturing overhead for a manufacturing business. Managers pay close attention to the gross profit margin as it includes the revenues and expenses directly traceable to a product. This information is combined with an item’s inventory turnover ratio to determine its total profitability. In a retail environment, less profitable products may be relegated to the top shelf or the back of the store, allowing more profitable items to be located in high-traffic areas. Unprofitable products are discontinued entirely to focus on more promising items.

Gross profit margin is affected by both changing prices and purchasing or manufacturing costs. Prices may change due to:

* Increased domestic or international competition
* National or local recessions
* Price discounts to move excess inventories or promote new products, or store openings
* Superior branding, customer service, product selection, location, product quality, or technology
* Change in pricing strategy

Purchasing and manufacturing costs may change due to:

* Varying raw materials and parts prices
* Lower domestic and overseas sourcing costs
* Greater use of quantity discounts, competitive bidding, and early payment discounts
* Labour difficulties or more expensive union contracts
* Introduction of self-directed work teams that improve employee efficiency
* Greater use of just-in-time inventory and production management
* Factory automation or relocation to lower-cost areas domestically or internationally
* Reduced theft, spoilage, or scrap

**Operating profit margin.** This ratio measures a company’s profitability as a percentage of net sales after deducting both the cost of sales and operating expenses.

$$Operating profit margin= \frac{Operating income or EBIT}{Net sales}$$

Operating expenses include selling, general, and administrative (SG&A) expenses. They are not directly traceable to a product and are usually under the direct control of senior management. These costs are not relevant when evaluating the profitability of a particular product, but are essential when examining the profitability of a division or the entire firm. Analysts should consider the following:

* Many operating costs are fixed, so they fall as a percentage of sales over a specific production range but then increase once the limit is reached. Fixed costs make operating income more variable in the short term.
* Capital-intensive companies with newer assets have higher depreciation expenses as a percentage of sales.
* Capital-intensive companies with older assets have higher maintenance expenses as a percentage of sales.
* Corporate administration is prone to becoming “fat,” especially in a cyclical upturn when cash flows are high and there are no pressures to reduce expenses. Companies should strive to remain “lean and mean” by downsizing their corporate staff, effectively utilizing information technology, relocating their head offices to lower-rent areas in the suburbs, a new city, or a new country, or outsourcing administrative functions such as call centers, computing services, and benefits administration.
* Rapid growth usually lowers operating profit margins initially as expenditures must be made to develop new markets and customers before sales can expand.
* Rising selling costs as a percentage of sales could be due to entering new sales territories, increased competition from market saturation, or improved customer service and support.
* Companies may reduce discretionary expenses such as maintenance, advertising, research and development, or employee training to cope with cash shortages, but reducing these necessary expenditures will have serious long-term consequences.

**Net profit margin.** This ratio measures a company’s profitability as a percentage of net sales after all expenses.

$$Net profit margin= \frac{Net income}{Net sales}$$

The difference between operating and net income is interest and income tax expense. Interest expenses decrease due to lower interest rates, reduced borrowing, and increased use of lower-rate short-term debt or interest-free financing, such as accounts payable. Income tax as a percentage of earnings before taxes (EBT) declines due to lower statutory tax rates, more generous tax credits, a greater proportion of foreign income from a low-tax jurisdiction, and effective tax planning strategies.

**Relative to Investment**

**Operating return on assets.**  This ratio compares a firm’s operating income to the total assets used to generate that profit.

$$Operating return on assets= \frac{Operating income or EBIT}{Average total assets}$$

It measures the profitability of a firm’s underlying products and services regardless of how they are financed or taxed. Firms often use the operating return to measure the performance of their different business units. Managers of these units generally have the authority to set prices and incur operating expenses. Still, interest expenses are determined by senior management, who decides the company’s level of borrowing and negotiates any financing. The government also determines the income tax expense, although senior management has some control over this cost through the effectiveness of its tax planning strategies.

**Return on assets.** This ratio relates a firm’s operating income (EBIT) after tax to the total assets used to generate that profit.

$$Return on assets= \frac{EBIT (1-t)}{Average total assets}$$

People often joke that there are only two inevitabilities in life, which are death and taxes. Even though taxes are not directly related to a business unit and are not controlled by its managers, the return on assets includes them because they are unavoidable. Interest is still not included, so the return on assets is unaffected by how a company is financed. For simplicity, many financial information providers calculate the return on assets (ROA) as net income divided by average total assets; therefore, be certain how the ratio was calculated before making comparisons.

**Return on equity.** This ratio relates a firm’s net income to the equity investment made by its common shareholders, reflecting how the business is financed and taxed.

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

Borrowing reduces the equity investment that shareholders must make in a new business, but it also increases interest costs, which reduce the profit. If a company can earn more than it costs to borrow, it can raise its ROE above its ROA. This is commonly referred to as “putting other people’s money to work for you” or the “magic of financial leverage.” An example in Exhibit 1 explains this concept.

**Exhibit 1: Raising the Return on Equity**

**Assets = CAD 100**

**Operating income = CAD 10**

**Cost of borrowing = 8.0%**

**Tax Rate = 25.0%**

**Debt Ratio = 0.0%**

**Debt Ratio = 50.0%**

**Debt Ratio = 90.0%**

**A**

**E**

**A**

**L**

**E**

**A**

**L**

**E**

|  |  |  |  |
| --- | --- | --- | --- |
| Operating return on assets | = 10 ÷ 100= 10.0% | = 10 ÷ 100= 10.0% | = 10 ÷ 100= 10.0% |
| ROA | = (10) (1 – .25) ÷ 100= 7.5% | = (10) (1 – .25) ÷ 100= 7.5% | = (10) (1 – .25) ÷ 100= 7.5% |
| ROE | = (10 – (0) (.08)) (1 – .25) ÷ 100= (10 – 0) (1 – .25) ÷ 100= 7.5 ÷ 100 = 7.5% | = (10 – (50) (.08)) (1 – .25) ÷ 50= (10 – 4) (1 – .25) ÷ 50= 4.5 ÷ 50= 9.0% | = (10 – (90) (.08)) (1 – .25) ÷ 10= (10 – 7.2) (1 – .25) ÷ 10= 2.1 ÷ 10= 21.0% |

ABC has CAD 100 in assets and earns an operating income of CAD 10 annually, yielding an operating return on assets of 10.0% and a return on assets of 7.5%. These returns are the same regardless of ABC’s debt ratio, as both are calculated before interest is considered. ABC is currently not borrowing any funds, but its operating return on assets of 10.0% is higher than its cost of borrowing, so it has decided to raise its ROE by borrowing. At a debt ratio of 0.0%, ABC’s ROA and ROE are the same, as there are no interest costs. At a debt ratio of 50.0%, ABC will lower its equity investment to CAD 50 by borrowing CAD 50 or half of its total assets. With the loan, interest expense of CAD 4 will be incurred and deducted from the operating income of CAD 10. After deducting income tax at a rate of 25%, ABC’s net income is CAD 4.5.

ABC’s net income has fallen from CAD 7.5 at a debt ratio of 0.0% to CAD 4.5 at a debt ratio of 50.0% due to higher interest costs. Interest increased by CAD 4.0, but net income only fell by CAD 2.5 because the interest is tax-deductible, which saves ABC taxes and reduces the expense. Specifically, being able to deduct CAD 4 interest saves ABC CAD 1.0 (CAD 4 × 0.25), which reduces the expense to CAD 3.0 (CAD 4 – CAD 1 or CAD 4 × (1 – 0.25)). Although ABC’s net income has fallen by 40.0% ((7.5 – 4.5) ÷ 7.5), the equity investment by its common shareholders has fallen faster by 100.0% ((100 – 50) ÷ 50). If the denominator in the ROE formula falls at a faster rate than the numerator, the ratio will rise. ABC’s ROE rose from 7.5% to 9.0%, which is a 20.0% ((9.0 – 7.5) ÷ 7.5) increase in return.

If ABC wants to raise ROE further, it can borrow more. At a debt ratio of 90.0%, its ROE would rise to 21.0%, representing an increase of 133.3%. However, ABC operates in an industry with an average debt ratio of only 50.0%. Why would its competitors not have a debt ratio of 90.0% or higher to maximize their ROE? The reason is that borrowing increases a firm’s risk of going bankrupt due to the risk of having insufficient operating income to pay the fixed interest payments. At a debt ratio of 90.0%, ABC would have interest costs of CAD 7.2. If its operating income of CAD 10 remains stable, it will be able to pay the required interest. Most businesses are cyclical to some degree, which means their operating income will fluctuate over the business cycle. Competitive industries or those subject to considerable technological change will have even greater variability in their operating income. If ABC’s operating income falls below CAD 7.2, it will be unable to pay the interest owed and will be declared bankrupt by its creditors. To prevent bankruptcy, most companies limit their borrowing so that the required interest payments on their debt can be made even during an economic downturn when operating income falls. The optimal level of borrowing is determined primarily by the variability of a firm’s operating income. In ABC’s industry, an average debt ratio of 50.0% was found to be safe.

**Analysis of Return on Equity**

Shareholders will only invest in a business if it earns a competitive return on their investment. A firm’s ROE ultimately determines whether it is successful or not.

$$Formula 1 Return on equity= \frac{Net income}{Average total equity}$$

Given the importance of ROE, companies are not satisfied with just knowing that the ratio has gone up or down or how it compares to the industry average. They want to understand why it changed so they can address problems and build on further successes. This can be accomplished by disaggregating the basic ROE formula into its different components.

Net profit margin

Total asset turnover ratio

Equity multiplier

Return on assets

$$Formula 2 Return on equity= \frac{Net income}{Sales} × \frac{Sales}{Average total assets} × \frac{Average total assets}{Average total equity}$$

Formulas 1 and 2 are equivalent, as both sales and average total assets in Formula 2 cancel, leaving Formula 1. Formula 2 shows that ROE is a function of profitability relative to sales, turnover, and financial leverage. Holding the other components constant, a firm’s ROE will increase if either its net profit margin or total asset turnover rises. The net profit margin and total asset turnover are interdependent. As shown in Formula 2, the net profit margin times total assets turnover equals ROA, as sales in the two equations cancel, leaving net income divided by average total assets, or ROA. Practically, companies frequently raise prices, hoping to increase their ROA. Higher prices will cause the net profit margin to rise, but it will also cause total asset turnover to fall as customers buy fewer units. If a firm’s demand curve is inelastic, profits will increase as the benefits from higher prices are greater than any losses from the decline in the units sold. Companies also try to raise profits by lowering prices, hoping the higher total assets turnover compensates for the lower net profit margin. Companies are constantly trying to find the price point that maximizes their profits and ROA.

Equity multiplier measures a company’s level of borrowing. As it borrows more, ROE rises as its equity becomes smaller.

$$Formula 3 Return on equity= \frac{\frac{Net income}{Sales} × \frac{Sales}{Average total assets}}{\frac{Average total equity}{Average total assets}}$$

Debt ratio

$$Formula 4 Return on equity= \frac{\frac{Net income}{Sales} × \frac{Sales}{Average total assets}}{1- \frac{Average total debt}{Average total assets}}$$

Instead of the equity multiplier, the debt ratio can be used to measure financial leverage. In Formula 3, the equity multiplier is inverted and moved into the denominator. In Formula 4, the ratio of average total equity to average total assets is replaced by (1 - debt ratio). If the debt ratio rises, the denominator will become smaller, and the ROE will increase as long as the firm is earning its cost of borrowing.

The three-way analysis of ROE can be expanded further to include more components. The five-way analysis disaggregates the net profit margin into operating profit margin, interest burden, and tax burden, as shown in Formula 5. Both EBIT and EBT in the first three components cancel, leaving the net profit margin; therefore, Formulas 4 and 5 are equivalent.

Operating profit margin

Tax burden

Interest burden

Total asset turnover ratio

Return on assets

Debt ratio

$$Formula 5 Return on equity= \frac{\frac{EBIT}{Sales}× \frac{EBT}{EBIT}×\frac{NI}{EBT}× \frac{Sales}{Average total assets}}{1- \frac{Average total debt}{Average total assets}}$$

The operating profit measures profitability after deducting the cost of sales and operating expenses, but before deducting interest and taxes. The interest burden ratio monitors interest expense separately. Ideally, a company wants to pay an interest rate of 0.0% on its loans. If this occurs, the interest burden ratio would be 1.0 as EBT and EBIT are the same. As interest rates rise, the interest burden ratio falls. The ratio also falls if the interest rate remains constant but the company’s borrowing level rises. The logic is the same for the tax burden. A falling tax burden ratio means a company’s tax rate is increasing.

To summarize, a firm’s ROE is a function of its operating profit margin, interest burden, tax burden, total asset turnover, and debt ratio. It will rise if any ratio increases and fall if any ratio decreases. With all these ratios working together, it isn't easy to comprehend the importance of each component. This problem can be addressed by changing one ratio at a time and determining the effect on ROE. These amounts add up to the total change in ROE.

**Segmented Reporting**

A company may be performing well overall, but this could mask serious issues with one or more of its operating segments. Managers must be able to measure the performance of each segment so that resources can be allocated effectively, which may include divesting or closing struggling business units. Profit margins also vary across different products, customers, and export markets, so changes in the sales mix can significantly impact profits. Finally, overemphasizing one product, customer, region, or country at the expense of greater diversification puts a company at considerable risk if difficulties arise.

Under IFRS, companies are required to provide segmented financial information. An operating segment is a business component that earns revenues and incurs expenses, produces separate financial details, and regularly reports to senior management, who assess its performance and allocate resources. An operating segment is disclosed separately if it accounts for 10.0% or more of a company’s combined revenues, assets, profits, or losses. The operating segments identified must account for at least 75% of a company’s revenue, with an “other operating segments” category used for the remainder. Additional segments under 10% must be reported separately if the disclosed segments do not account for at least 75% of total revenues. In addition to sales, each segment should provide a detailed accounting of its profits, losses, assets, and liabilities if the information is available. This can be used to calculate the debt ratio and operating return on assets for each segment and disaggregate the operating return on assets into operating profit margin and total assets.

A company’s combined revenues should also be reported by product or service category, customer type, and domestic versus international. Specific customers or countries with a material amount of sales are also disclosed separately. Companies are exempt from these disclosures if the information is unavailable and the cost to collect it is excessive.

**1.6 | Market Valuation**

The goal of any public company is to maximize the value of its common shares. Firms attempt to ensure that management is focused on this task by using share-based compensation plans that only reward them if the share price increases. Managers also need to know if their common shares are fairly valued at specific times so they can effectively time certain transactions. For example, public companies attempt to repurchase existing shares when they are undervalued and sell new shares when they are overvalued, thereby benefiting their shareholders.

Market valuation ratios relate a public company’s share price to different accounting-based performance measures. These ratios are less important to private companies whose shares do not trade publicly.

**Basic earnings per common share.** This ratio measures the net income earned by each common share after paying any preferred dividends.

$$Basic earnings per common share= \frac{Net income-Preferred dividends}{Weighted average number of common shares}$$

Preferred dividends are deducted each year regardless of whether they are paid or not because preferred shareholders must generally be paid in full, including any dividends in arrears, before common shareholders can receive a dividend. If shares are issued or repurchased during the year, a weighted average number of shares is computed reflecting the date of each transaction. In addition to basic earnings per common share (EPS), firms must also report diluted EPS. Many corporations issue dilutive securities, such as stock options, convertible bonds, convertible preferred shares, or warrants, which increase the number of common shares if exercised or converted. Diluted EPS is a “what if” analysis that shows the effect these transactions would have on basic EPS. In addition to increasing the number of common shares, which lowers diluted EPS, any interest and dividends paid on the convertible bonds and preferred shares are eliminated, which raises diluted EPS. Based on the conservatism principle of accounting, diluted EPS is only reported if it is lower than basic EPS. Basic and diluted EPS are also adjusted for any stock splits, assuming they occurred at the beginning of the fiscal year.

**Dividend payout ratio.** This ratio indicates what portion of a company’s net income is paid to its common shareholders as dividends.

$$Dividend payout ratio= \frac{Dividends per common share}{Earnings per common share}$$

Retained earnings are an essential source of financing. This is especially true for small businesses with limited access to the financial markets or companies experiencing rapid growth. Their dividend payout ratios are low, so they need all their earnings to finance growth. As a business matures and its growth rate declines, its dividend payout ratio rises. To provide greater financial flexibility, companies are increasingly distributing earnings to their common shareholders by repurchasing common shares on an irregular basis, thereby avoiding the obligation to pay regular cash dividends. Since stock repurchases are a substitute for paying cash dividends, many analysts combine these two amounts when calculating the dividend payout ratio. The retention ratio is a variation of the dividend payout ratio, which indicates the portion of earnings that is retained within the business.

$$Retention ratio= 1- Dividend payout ratio$$

**Dividend yield.** This ratio is the common shareholders’ cash return on investment. It relates the annual cash dividend to the market price of the share, which is what an investor currently pays to buy one common share.

$$Dividend yield= \frac{Dividends per common share}{Market value of common share}$$

As for the dividend payout ratio, the dividend yield is low for small businesses that need their earnings to grow, but it rises as they mature.

**Earnings yield.** This ratio represents the total return on investment for common shareholders. It relates annual earnings to the market value of the share.

$$Earnings yield= \frac{Earning per common share}{Market value of common share}$$

The dividend yield understates an investor’s return because it only includes their cash dividend and not the earnings retained in the business. These earnings are eventually realized when the share is sold at a profit.

**Price-to-earnings ratio.** This ratio is how many times current EPS investors are willing to pay for a company’s common share. It is the reciprocal of the earnings yield.

$$Price–to–earnings ratio= \frac{Market value of common share}{Earnings per common share}$$

A high price-to-earnings (P/E) ratio typically indicates that a company has strong growth prospects. Investors are willing to pay more for current earnings as they expect future earnings to grow rapidly. A low PE ratio means a firm has lower growth prospects or higher risk. A company’s PE ratio is often compared to the industry average. If it is higher than the industry average, the share may be overvalued. The company could decide to sell new shares now at a higher price before the PE ratio falls to the industry average. If its PE ratio is lower than the industry average, the share may be undervalued. The company could decide to repurchase shares while the price is low and resell them later at a higher price after the PE ratio has risen to the industry average. The PE ratio is approximately 16.0 for U.S. firms, but there is considerable variation by industry and over time.

**Book value per common share.** This ratio equals total shareholders’ equity minus the book value of any preferred shares divided by the number of common shares.

$$Book value per common share= \frac{Common shareholders^{'}equity}{Weighted average number of common shares}$$

Book value per common share is considered a floor price for a company’s common share. Many of its assets are recorded at historical cost instead of fair market value, and other assets, such as intangibles or goodwill, are excluded entirely; therefore, the market value per common share is likely significantly higher. Other analysts take a more pessimistic view of book value per common share, subtracting all intangible assets and goodwill due to their uncertain future value. This is referred to as tangible net worth per common share.

**Price-to-book value ratio.** This ratio indicates the number of times the book value per common share investors will pay for a firm’s common share.

$$Price–to–book value ratio= \frac{Market value per common share}{Book value per common share}$$

Like the price-earnings ratio, a high price-to-book ratio usually means that a company has strong earnings growth prospects, while a low PBV ratio means it has low earnings growth prospects or higher risk. This ratio can be compared to the industry average PBV ratio to determine if a company’s shares are under- or overvalued. Some analysts use tangible net worth instead of book value per common share to provide a more conservative valuation. The PBV ratio is approximately 3.0 for U.S. firms, but there is considerable variation by industry and over time.

**1.7 | Vertical and Horizontal Analysis Using Common-sized Financial Statements**

Analysts frequently compare the financial statements of different companies; however, this is challenging if the companies are of varying sizes. A net income of CAD 1 million may be a great success for a smaller business, but a major disappointment for a larger firm. This problem is solved by using common-sized financial statements, which can be analyzed either vertically or horizontally.

With vertical analysis, the financial statements are adjusted for size by dividing all amounts on the income statement and cash flow statement by net sales and all amounts on the balance sheet by total assets. These percentages duplicate some financial ratios, such as the gross or net profit margins, but they provide considerable additional information. Analysts can assess these ratios in a specific year or compare them over time to spot operational successes and failures. Exhibit 2 provides an example of a vertical analysis for Churchill Ltd.

**Exhibit 2: Vertical Analysis for Churchill Ltd.**

|  |
| --- |
| **Income Statement****For the Year Ending December 31** |
|  | **2010** | **2011** | **2012** |
| Sales | 100.00% | 100.00% | 100.00% |
|  Cost of sales | 76.48% | 77.61% | 70.00% |
| Gross profit | 23.52% | 22.39% | 30.00% |
|  Depreciation expense | 0.48% | 0.49% | 1.44% |
|  Operating expenses | 15.41% | 15.07% | 25.00% |
| Income before interest and taxes | 7.64% | 6.82% | 3.56% |
|  Interest expense | 1.21% | 1.15% | 3.48% |
| Income before taxes | 6.43% | 5.67% | 0.08% |
|  Income tax expense | 2.57% | 2.27% | 0.03% |
| Net Income | 3.86% | 3.40% | 0.05% |

|  |
| --- |
| **Balance Sheet****As of December 31** |
|  | **2010** | **2011** | **2012** |
| Cash and cash equivalents | 7.88% | 6.03% | 0.99% |
| Accounts receivable | 3.95% | 4.86% | 3.81% |
| Inventory | 58.75% | 61.01% | 53.20% |
| Prepaid expenses | 1.85% | 2.16% | .99% |
|  Total current assets | 72.43% | 74.06% | 59.00% |
| Property, plant, and equipment | 28.71% | 27.90% | 43.69% |
| Less: Accumulated depreciation | 1.15% | 1.95% | 2.69% |
| Net property, plant, and equipment | 27.57% | 25.94% | 41.00% |
| Total assets | 100.00% | 100.00% | 100.00% |
| Accounts payable | 5.00% | 4.86% | 8.10% |
| Line of credit | 16.42% | 24.71% | 28.59% |
| Other payables | 5.36% | 5.78% | 9.75% |
| Current portion of long-term debt | 1.48% | 1.26% | 1.97% |
|  Total current liabilities | 28.27% | 36.61% | 48.41% |
| Long-term debt | 19.51% | 17.64% | 29.54% |
| Shareholders’ equity | 52.22% | 45.75% | 22.05% |
| Total liabilities and equities | 100.00% | 100.00% | 100.00% |

Looking at the income statement, Churchill’s gross profit margin rose substantially due to either higher prices or declining sales costs. Depreciation and operating expenses as a percentage of sales increased significantly, resulting in a decline in the operating margin. Depreciation likely increased due to asset purchases aimed at supporting the company’s growth. Operating expenses may have risen due to inefficiencies or sales lagging expenditures during an expansion. Interest expense as a percentage of sales increased due to higher interest rates and more borrowing, resulting in lower EBT. The income tax expense declined due to a falling EBT.

The balance sheet confirms Churchill is purchasing new assets as net property, plant, and equipment rose substantially as a percentage of total assets. These assets were financed with a combination of cash and debt, resulting in a significant decline in cash and cash equivalents and a corresponding increase in long-term debt. Cash and cash equivalents are at a dangerously low level, putting the company at risk of bankruptcy. Long-term debt has nearly doubled, but the company has also “stretched” its payables and borrowed heavily on its line of credit. A line of credit should only be used to finance accounts receivable and inventory, but these assets have decreased. Accounts receivable are stable as a percentage of sales, but it is a relatively minor item. Inventories may have declined due to improved management or have been intentionally reduced to address the cash shortage.

Many of Churchill’s expenses increased as a percentage of sales. It is difficult to determine whether this is due to inefficiencies or whether these costs are largely fixed and have risen as a percentage of declining sales. To supplement the vertical analysis in Exhibit 2, a horizontal analysis was prepared in Exhibit 3, where all amounts on the financial statements are expressed as a percentage of their values in a standard base year providing a growth rate for each item.

**Exhibit 3: Horizontal Analysis for Churchill Ltd.**

|  |
| --- |
| **Income Statement****For the Year Ending December 31** |
|  | **2010** | **2011** | **2012** |
| Sales | 100.00 | 129.17 | 143.81 |
|  Cost of sales | 100.00 | 131.09 | 131.63 |
| Gross profit | 100.00 | 122.93 | 183.41 |
|  Depreciation expense | 100.00 | 133.33 | 434.41 |
|  Operating expenses | 100.00 | 126.33 | 233.33 |
| Income before interest and taxes | 100.00 | 115.40 | 66.98 |
|  Interest expense | 100.00 | 122.46 | 412.80 |
| Income before taxes | 100.00 | 114.07 | 1.74 |
|  Income tax expense | 100.00 | 114.07 | 1.74 |
| Net income | 100.00 | 114.07 | 1.74 |

|  |
| --- |
| **Balance Sheet****As of December 31** |
|  | **2010** | **2011** | **2012** |
| Cash and cash equivalents | 100.00 | 105.02 | 36.05 |
| Accounts receivable | 100.00 | 168.75 | 275.00 |
| Inventory | 100.00 | 142.53 | 258.57 |
| Prepaid expenses | 100.00 | 160.00 | 153.33 |
|  Total current assets | 100.00 | 140.32 | 232.57 |
| Property, plant, and equipment | 100.00 | 133.33 | 434.41 |
| Less: Accumulative depreciation | 100.00 | 233.33 | 667.74 |
| Net property, plant, and equipment | 100.00 | 129.17 | 424.69 |
|  Total assets | 100.00 | 137.25 | 285.53 |
| Accounts payable | 100.00 | 133.33 | 462.22 |
| Other payables | 100.00 | 148.09 | 519.50 |
| Line of credit | 100.00 | 206.48 | 497.03 |
| Current portion of long-term debt | 100.00 | 116.67 | 379.17 |
|  Total current liabilities | 100.00 | 177.76 | 488.95 |
| Long-term debt | 100.00 | 124.05 | 432.28 |
| Shareholders’ equity | 100.00 | 120.25 | 120.56 |
|  Total Liabilities and Equities | 100.00 | 137.25 | 285.53 |

The income statement confirms sales rose dramatically due to greater unit sales or higher prices. In a horizontal analysis of the income statement, analysts should focus on items that grew at a materially different rate from sales. The growth rate of the gross profit margin exceeds the growth rate of sales, indicating higher prices or lower costs of sales. Depreciation, operating, and interest expenses all increased at a significantly higher rate than sales, primarily due to asset purchases, inefficiencies, lagging sales expenditures, and increased borrowing, as discussed. With the balance sheet, users should focus on items that grew at a materially different rate than total assets. Cash and cash equivalents decreased, while current and long-term liabilities rose significantly, compared to total assets, to fund asset purchases. Accounts receivable grew at a similar rate to sales, but inventory levels declined as the company reduced its stock to generate the necessary cash.

Overall, sales and gross profit are increasing rapidly at Churchill, but its EBIT is declining due to rising operating costs. Too many assets were purchased to support growth. The company’s use of financial leverage is excessive, and it is nearly out of cash. Churchill risks going bankrupt unless it reduces operating costs and asset purchases.

**1.8 | Cash Flow Analysis**

Net income based on accrual accounting is a substantial measure of a firm’s financial performance; however, it can be manipulated by selecting different accounting policies, practices, and estimates or through fraudulent activities. Alternatively, cash flows are less sensitive to management discretion, providing a more accurate indicator of a company’s ability to pay its operating expenses to various suppliers, interest and principal to debt holders, taxes to the government, and dividends to shareholders. If a firm exhausts its cash reserves, it will likely go bankrupt, so managers frequently use the phrase “cash is king.”

Recognizing the importance of cash, accountants have long supplemented the income statement and balance sheet with the cash flow statement. Some analysts have also replaced traditional financial ratios, which use information from the income statement and balance sheet, with cash flow-based ratios that incorporate information from the cash flow statement as well.

**Cash Flow Statement Analysis**

The cash flow statement explains why a firm’s cash and cash equivalents changed over a period. Beginning cash and cash equivalents plus cash flow from operations (CFO), cash flow from investing (CFI), and cash flow from financing (CFF) equals ending cash and cash equivalents.

**Exhibit 4: Cash Flow Statement Analysis at Techno Ltd.**

|  |
| --- |
| **Techno Ltd.****Cash Flow Statement****For the Year Ending December 31 (CAD thousands)** |
| Cash flow from operations |   |   | Cash flow from investing |   |   |
| Net income |   |  114,450  |  Purchase of land | (63,000) |   |
| Add (deduct): |   |   |  Purchase of equipment | (55,650) |   |
|  Depreciation and amortization | 16,800  |   |  Overhaul of equipment | (11,550) |   |
|  Loss on sale of equipment | 1,575  |   |  Sale of equipment | 4,200  |   |
|  Increase in accounts receivable | (59,325) |   | Net cash flow from investing |   | (126,000) |
|  Increase in inventories | (156,450) |   | Cash flow from financing |   |   |
|  Decrease in prepaid expenses | 525  |   |  Issuance of a loan payable | 82,425  |   |
|  Increase in accounts payable | 1,050  |   |  Issuance of common shares | 151,200  |   |
|  Increase in other liabilities | 4,200  |   |  Cash dividend | (6,300) |   |
|  Decrease in taxes payable | (13,650) | (205,275) |  Share repurchases | (17,850) |   |
| Net cash flow from operations |   | (90,825) | Net cash flow from financing |   | 209,475  |
|   |   |   | Beginning cash and cash equivalents |   | 47,460  |
|   |   |   | Ending cash and cash equivalents |   | 40,110  |

CFO is the cash generated from a firm’s regular business operations. It starts with net income, adds back depreciation and amortization, removes gains and losses on asset sales, and adjusts for inventory changes, accounts receivable, accounts payable, and other working capital items. Depreciation and amortization are added back to net income because they are non-cash expenses. Gains and losses on asset sales are excluded because they do not align with the cash flows from the transactions and are not representative of normal business operations. If inventory increased, the firm purchased more inventory than was included in the cost of sales, causing the CFO to fall. If inventory decreased, existing inventory that had already been paid for was used to meet current sales, causing the CFO to rise. If accounts receivable rose, customers took longer to pay, resulting in lower cash collections compared to sales. If accounts receivable fell, cash collections included accounts receivable from both the previous year and the current year, resulting in cash collections being higher than sales. Its accounts payable increased, and the company took longer to pay its obligations, causing the CFO to rise. If accounts payable decreased, it paid both this year’s commitments and some from the previous year, causing the CFO to fall.

CFI consists of cash outflows from capital expenditures, but also includes cash inflows from the sale of older property, plant, and equipment, as well as cash outflows and inflows from the purchase and sale of financial assets. When preparing a cash flow statement, cash equivalents are added to cash, but the purchase and sale of short-term and long-term investments are included in the CFO. Gains or losses are calculated based on an asset’s book value, so they are not equal to the cash flow from its sale. CFF includes cash inflows from new debt and equity funding, as well as cash outflows from debt repayment and cash distributions to shareholders.

Most companies have a target cash balance, so changes in cash and cash equivalents from one accounting period to the next are usually minimal. Regardless, careful analysis of CFO, CFI, and CFF provides essential information about a firm’s financial performance as seen in Exhibit 4. Techco Ltd. is a rapidly growing technology start-up that has been in operation for five years and is currently controlled by its founder.

**Cash flow from operations**. Techno is profitable, but its CFO is negative. A business’s operations typically generate cash flow. Techco’s operations are a cash drain because of significant increases in accounts receivable and inventory. Further investigation reveals the company provided generous credit terms to its retail network. Retailers are small, independent businesses that often struggle to secure bank financing and, therefore, rely heavily on Techco for assistance. Inventory is increasing due to a parts shortage that has forced Techno to stockpile inventory. The company’s rapid growth and lack of production experience also led to higher work-in-progress and finished goods inventory.

**Cash flow from investing.** Investing is typically a substantial use of funds. Techco expanded its output by purchasing new equipment and undertaking a significant overhaul of its older equipment. The land purchased indicates the company plans to construct a new factory or a factory extension to address capacity constraints resulting from its rapid growth. This will result in additional construction costs and future equipment purchases.

**Cash flow from financing.** CFO and CFF are used to finance CFI and balance out any fluctuations in cash and cash equivalents. CFO was negative due to an increase in accounts receivable and inventory, so Techco had no alternative but to negotiate a large bank loan and issue a significant number of common shares. Techco borrowed 70.0% of the value of the new land and equipment, so raising additional debt is not an option for this period, as lenders want to ensure that their collateral is worth more than the value of the loan. The share issuance will cause a dilution of ownership for the founder and potentially a loss of control if it is repeated in the future as the company continues to grow. Whether to raise new equity to finance growth is a significant dilemma for start-ups. Entrepreneurs must decide whether to own a smaller percentage of a much larger firm by selling new shares or continue to own 100.0% of a smaller company. The first option is probably more lucrative, especially if the smaller company is eventually put out of business by its larger competitors.

**Cash Flow Statement Manipulation**

IFRS gives companies considerable discretion in classifying certain transactions, which allows them to manipulate the CFO. Typically, interest paid and interest and dividend income received are classified as operating activities as they are included in net income. Interest paid can also be classified as a financing activity, as it is a cost of borrowing, which increases the CFO. Interest and dividends received may be classified as investing activities, as they represent investment returns that lower the CFO. Dividends paid are typically classified as a financing activity because they are a cost of financing. They may be classified as an operating activity to assist users in determining an entity’s ability to pay dividends out of operating cash flow, which lowers the CFO.

To raise CFO further, companies can capitalize additional costs as fixed assets, so they appear as investing activities rather than operating activities. Over the short term, they can also defer payments on accounts payable, delay discretionary costs such as advertising, maintenance, and research and development, reduce inventory purchases, or accelerate accounts receivable collections using expensive cash discounts or factoring. Non-recurring or one-time items, such as restructuring charges or legal settlements, can also be recognized as needed to manipulate the CFO.

Under US GAAP, interest paid and interest and dividend income received must be included in operating activities, while dividends paid are classified as financing activities. This provides a more accurate measure of CFO to finance capital expenditures, make required principal payments, and pay dividends. These amounts must be disclosed separately under IFRS so analysts can easily reclassify them. Other adjustments relating to the manipulation of CFO and non-recurring items should be made if the necessary information is available.

**Cash Flow-Based Financial Ratios**

Most cash flow-based financial ratios replicate a traditional financial ratio by substituting CFO for net income, as it is much less sensitive to accounting manipulation.

**Exhibit 5: Cash Flow-Based Financial Ratios**

|  |  |
| --- | --- |
| **Cash Flow-Based Ratio** | **Traditional Ratio** |
| **Liquidity** |
| $$Operating cash flow ratio= \frac{Cash flow from operations}{Current liabilities}$$Cash flow from operations replaces current assets in the current ratio. This ratio measures a company’s ability to satisfy its current liabilities with its cash flow from operations in each period. | Current ratio |
| $$Defensive internal= \frac{Cash and cash equivalents+Short–term investments+Receivables}{Average daily cash expenditures}$$This ratio, also known as the “burn rate,” measures the number of days a company can cover its regular operating expenses using only its liquid assets. It is used by start-ups and companies experiencing financial distress who will have difficulty generating additional funds soon. Average daily cash expenditures can be approximated by dividing regular operating expenses by 365 days, after adjusting for non-cash items such as depreciation and amortization. | None |
| $$Cash to income ratio= \frac{Cash flow from operations+Interest expense+Incomes taxes}{Operating income}$$Cash flow from operations is measured relative to operating income. Interest expense and income taxes are added to cash flow from operations because they are not included in operating income, which makes the numerator and denominator more comparable. If this ratio falls significantly below 1.0, analysts should be suspicious. The company may be recognizing revenues prematurely or capitalizing operating expenses to inflate operating income. If the cash-to-income ratio has been well below 1.0 but then suddenly improves, the company may be “stretching” payables, reducing inventories below regular levels, tightening credit terms, or deferring discretionary costs such as maintenance, advertising, and training to raise needed cash and hide a cash flow problem. | None |
| **Asset Management** |
| $$Cash to fixed assets ratio= \frac{Cash flow from operations}{Average fixed assets}$$Cash flow from operations replaces net sales in the calculation of the fixed asset turnover ratio. This ratio measures cash flow from operations generated by each dollar of fixed assets. Other asset categories, such as intangible assets or total assets, can be used as substitutes for fixed assets. | Fixed asset turnover ratio |

|  |
| --- |
| **Long-term Debt Paying Ability** |
| $$Cash flow coverage= \frac{Cash flow from operations+Interest expense+ Income taxes+Lease expense}{Interest expense+Lease expense+ \frac{Preferred dividends}{(1 –t)}+ \frac{Principal payments}{(1 –t)}}$$Cash flow from operations replaces EBITDA in the fixed charge coverage ratio. EBITDA approximates cash flow by excluding depreciation and amortization, but it does not include changes in working capital items, such as inventory, accounts receivable, and accounts payable. | Fixed-charge coverage ratio |
| $$Free cash flow= Cash flow from operations –Capital expenditures$$Making regular capital expenditures to replace depreciated assets or facilitate growth is critical to the long-term success of any business. Capital expenditures refer to any additions to property, plant, and equipment, as well as intangible assets. Free cash flow deducts capital expenditures from cash flow from operations to emphasize their importance.  | None |
| $$Free cash flow coverage= \frac{Free cash flow+Interest expense+ Income taxes+Lease expense}{Lease expense+Interest expense+ \frac{Preferred dividends}{\left(1 –t\right)}+ \frac{Principal Pymts}{\left(1 –t\right)}}$$Free cash flow replaces EBITDA in the fixed charge coverage ratio or cash flow from operations in the cash flow coverage ratio. Free cash flow is a better measure because it deducts capital expenditures before determining if other fixed charges can be covered. | Fixed-charge coverage ratio |
| $$Interest coverage= \frac{Cash flow from operations+Interest paid+Taxes paid}{Interest paid}$$Cash flow from operations replaces EBIT in the times interest earned ratio. Since cash flow from operations usually includes interest and taxes, they must be added back in the numerator. | Times interest earned |
| $$Debt coverage= \frac{Cash flow from operations}{Total long–term debt}$$$$Debt payment coverage= \frac{Cash flow from operations}{Long–term debt payments}$$These ratios measure whether a company can pay its total debt or current long-term debt payments with its cash flow from operations. A firm is unlikely to be able to pay all its obligations, but it should be able to cover its long-term debt payments. Remember that cash flow from operations already includes lease, interest, and income tax expenses. | None |
| $$Capital expenditure coverage= \frac{Cash flow from operations}{Capital expenditures}$$Like free cash flow, this ratio emphasizes the importance of having sufficient financial resources to fund a firm’s capital expenditures. | None |
| $$Dividend coverage= \frac{Cash flow from operations}{Dividends}$$Reducing or delaying dividend payments can negatively affect a company’s share price, so being able to fund preferred and common share dividends is critical. | Dividend coverage ratio |
| **Profitability** |
| $$Cash flow margin= \frac{Cash flow from operations}{Net sales}$$Cash flow from operations replaces operating income or EBIT in the operating return on assets. It includes interest and taxes, but analysts typically do not adjust for these differences. | Operating return on assets |
| $$Cash return on assets= \frac{Cash flow from operations}{Average total assets}$$Cash flow from operations replaces EBIT (1–t) in the return on assets. Cash flow from operations includes interest, but analysts typically do not adjust for this difference. | Return on assets |
| $$Cash return on equity= \frac{Cash flow from operations}{Average total equity}$$Cash flow from operations replaces net income in the ROE. Cash flow from operations includes both interest and taxes, so in this respect, it is similar to net income. | Return on equity |
| **Market Valuation** |
| $$Cash flow per common share= \frac{Cash flow from operations-Preferred dividends}{Weighted average number of common shares outstanding}$$Cash flow from operations replaces net income in the EPS formula. IFRS provides companies with the option to report basic and diluted cash flow per share, alongside basic and diluted EPS, highlighting the importance of cash flow-based ratios. | Basic earnings per common share |
| $$Price–to–cash flow ratio= \frac{Market value of common share}{Cash flow per share}$$Cash flow per share replaces EPS in the PE ratio. This ratio may more accurately measure whether a firm’s share is over- or undervalued. | Price-to-earnings ratio |

Research indicates that cash flow-based ratios are superior to traditional financial ratios, particularly when analysts aim to identify firms with liquidity and long-term debt-paying ability issues, as well as predict business failures. CFO more accurately measures a firm’s ability to withstand declining operating performance. Users should employ both traditional and cash-flow-based financial ratios when evaluating a company to provide essential checks and balances, especially when there is a significant difference between CFO and operating income as measured by the cash-to-income ratio.

Information services providers are supplying more industry-average cash flow-based financial ratios, so their popularity with users should continue to increase.

**1.9 | Industry Average Ratios**

Financial statement analysis is most valuable when managers examine different financial ratios over time and benchmark them against industry average ratios. This enables companies to identify key trends and assess their performance in comparison to their competitors. Industry averages are available from several different sources in both Canada and the U.S.

**Canada**

In Canada, chartered banks and credit unions may provide industry average ratios for their clients to assess the creditworthiness of their businesses and any new customers, suppliers, or business partners. These ratios are compiled using the financial statements of their banking clients across Canada and the U.S.

Innovation, Science and Economic Development, a department of the Government of Canada, supplies financial ratios through “Financial Performance Data,” a free website that allows small and medium-sized businesses to access a vertical analysis of the income statement and balance sheet and key financial ratios for over 1,000 industries based on the North American Industry Classification System (NAICS). Larger Canadian companies must establish benchmarks using the annual reports of their competitors or rely on U.S. financial information providers. Given the highly integrated nature of the Canadian and U.S. economies, industry averages from U.S. sources, many of which include Canadian companies, are reliable.

**United States**

The primary sources of industry average ratios in the U.S. are Risk Management Association’s (RMA) “Annual Statement Studies,” Dun & Bradstreet’s “Key Business Ratios,” and Wolters Kluwer Publishers’ “Almanac of Business and Industrial Financial Ratios.” RMA provides an excellent example of what information these firms offer.

RMA is a not-for-profit professional association comprising 1,900 institutional members, including bank and non-bank lenders, as well as over 18,500 associates. The association promotes sound lending and risk management principles in the financial services industry. Their Annual Statement Studies are used regularly by practitioners. As a not-for-profit, RMA is very open about its methodologies and their statistical limitations.

The RMA [Annual Statement Studies](https://www.rmahq.org/uploadedFiles/Knowledge_Center/Publications_and_Tools/Statement_Studies/FRB_SampleReport_111110SoybeanFarming.pdf) provide the following information for each industry:

* Vertical analysis of a simplified income statement and balance sheet for each of the past five years
* Vertical analysis sorted by company size using either assets or sales
* Traditional liquidity, asset management, long-term debt-paying ability, and profitability ratios for the last five years that are sorted by size using either assets or sales
* Cash-flow-based financial ratios
* Net sales and total assets for the industry and each size category
* Median, upper quartile, and lower quartile values for all ratios
* Data source and sample size for all ratios
* Industry name and NAICS code

RMA ratios are based on over 260,000 financial statements from the commercial lending clients and prospects of its member organizations. Ratios are not published for an industry or size category if fewer than 30 or 10 companies report, ensuring the results are statistically accurate. Financial statements can be unqualified, reviewed, compiled, or taken from tax returns and other sources. Unqualified means the financial statements were subject to a full audit, and the public accounting firm had no reservations. A review or compilation is a less rigorous review for private companies. Ratios based on a higher proportion of unqualified statements are more reliable.

Industry average ratios are categorized by the size of a firm’s sales and assets to make a fairer comparison between large and small firms. Larger companies have greater economies of scale and more bargaining power with their suppliers and bankers, which allows them to negotiate lower prices and interest rates and borrow funds more easily. These advantages generally result in better ratios for larger firms.

Using median, upper quartile, and lower quartile ratios instead of average ratios helps eliminate the effect of outliers. The size of the interquartile range (i.e., the difference between the lower and upper quartiles) measures ratio variability. Providing net sales and total assets for the industry and each size category allows the user to determine the dollar value of the different income statement and balance sheet accounts using the percentages from the vertical analysis.

RMA identifies several reasons why their ratios may not be representative of a specific industry and recommends that they only be used as a general guideline. These include:

* All data supplied by member organizations are incorporated into its studies, so it is not randomly selected.
* Sample sizes for some industries may be small and contain extreme observations that disproportionately influence results.
* Industry classifications are based on a firm’s primary product, but financial results from all the industries it operates in are used.
* Different operational methods (i.e., capital versus labour intensive), business strategies (i.e., high versus low quality), and cost differences due to labour market conditions or geographical location make ratios less comparable.
* Varying accounting policies (i.e., depreciation methods, FIFO versus average cost, book value versus fair market value) or one-time transactions (i.e., legal settlements, restructuring charges) make ratios less comparable.
* Only year-end values are used, so seasonal variations in assets such as inventory, accounts receivable, or fixed assets are not considered.
* Industry average ratios vary over the business cycle, getting worse in a recession and improving during growth periods, but the benchmarks provided are not adjusted.

Internationally, the adoption of IFRS has made the financial statements of companies from different countries more comparable. Still, the U.S., China, and Japan, the world’s three largest economies, each follow different standards, although U.S. GAAP is very similar to IFRS.

**1.10 | Financial Statement Analysis at Canadian Companies**

Many industries have developed a unique set of operational measures that supplement the information provided by traditional and cash flow-based financial ratios examined in this module. The airline and banking industries are two examples.

**Air Canada**

Air Canada is Canada’s largest domestic, U.S. transborder, and international carrier. Along with its low-cost carrier Air Canada Rouge, Jazz Aviation, and other partners, it flies approximately 1,600 flights a day to over 200 destinations on six continents with a fleet of over 400 aircraft of various sizes and ranges. Its new loyalty program, Air Canada Altitude, allows it to reward frequent fliers with free travel and enhanced services such as priority check-in or business class upgrades. Membership in the Star Alliance with its 28 partner airlines gives Air Canada passengers access to 1,300 destinations in 190 countries through reciprocal capacity-sharing agreements. They can also earn frequent flier miles and use other airlines’ business class lounges during their international travels. Air Canada generates additional revenue through Air Canada Vacations and Air Canada Cargo, which together account for approximately 10% of its total revenue.

In the Highlights section of its annual report, Air Canada provides investors and other stakeholders with a summary of key financial and operating results. This includes traditional and cash flow-based financial ratios, as well as operational measures specific to the airline industry.

**Exhibit 6: Operational Measures at Air Canada**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **2019** | **2018** | **2017** | **2016** | **2015** |
| Operating income (in millions) | 1,650 | 1,496  | 1,371  | 1,345 | 1,496 |
| Revenue passenger miles (in millions) | 94,113 | 92,360  | 85,137 | 76,481 | 67,545 |
| Available seat miles (in millions) | 112,814 | 110,866  | 103,492 | 92,726 | 80,871 |
| Passenger load factor (%) | 83.4% | 83.3%  | 82.3% | 82.5% | 83.5% |
| Passenger revenue per RPM (in cents) | 18.3 | 17.6  | 17.1 | 16.8 | 18.0 |
| Passenger revenue per ASM (in cents) | 15.3 | 14.6  | 14.1 | 13.9 | 15.1 |
| Operating revenue per ASM (in cents) | 17.0 | 16.3  | 15.7 | 15.8 | 17.1 |
| Operating expense per ASM (in cents) | 15.5 | 15.2  | 14.4 | 14.4 | 15.3 |
| Adjusted CASM (in cents) | 10.9 | 10.6  | 10.6 | 10.9 | 11.3 |
| Average number of full-time equivalent employees  | 32.9 | 29.9  | 27.8 | 26.1 | 24.9 |
| Number of aircraft in the operating fleet at period end | 403 | 400  | 395 | 381 | 370 |
| Average fleet utilization (in hours per day) | 10.6 | 10.4  | 10.4 | 10.2 | 10.0 |
| Seats dispatched (in thousands) | 64,653 | 63,800  | 60,820 | 57,135 | 52,359 |
| Aircraft frequencies (in thousands) | 548.5 | 578.9  | 569.6 | 566 | 567 |
| Average stage length (in miles) | 1,745 | 1,738  | 1,702 | 1,623 | 1,545 |
| Fuel cost per litre (in cents) | 76.1 | 80.4  | 62.6 | 53.9 | 63.0 |
| Fuel litres (in millions) | 5,714 | 5,597  | 5,332 | 4,837 | 4,478 |
| Revenue passengers carried (in thousands) | 51,543 | 50,904  | 48,126 | 44,849 | 41,126 |

**Revenue passenger miles (RPM).** The total number of passengers carried times the miles they are flown on all flights.

**Available seat miles (ASM).** The total number of seats available is multiplied by the number of miles flown on all flights.

**Passenger load factor.** Capacity utilization is a measure that calculates RPM as a percentage of ASM.

**Passenger revenue per RPM (Yield).** Passenger revenue generated, excluding baggage fees, for each RPM. It is the average price passengers are charged for each mile flown, which is unaffected by the passenger load factor.

**Passenger revenue per ASM (PRASM).** Passenger revenue generated, excluding baggage fees, for each ASM. It is the average price received for each mile flown, regardless of whether the seat is full or not. This measure falls as the passenger load factor declines.

**Operating revenue per ASM.**  Operating revenues of all types are generated for each ASM.

**Operating expense per ASM (CASM).** Operating expenses of all types for each ASM.

**Adjusted CASM.** Operating expenses of all types for each ASM, excluding fuel costs.

**Seats dispatched—the** total number of seats on all non-stop flights. A non-stop flight has a take-off and a landing.

**Aircraft frequencies.** The total number of non-stop flights.

**Average stage length.** The average length of a non-stop flight is calculated as ASM divided by seats dispatched.

**Revenue passengers carried.** Total passengers carried on all flights with a separate flight number.

Air Canada's ASM increased by 39.5% from 2015 to 2019, while its passenger load factor remained constant, resulting in an equivalent rise in RPM. The difference between operating revenue per ASM and operating costs per ASM declined, so there was only a 10.3% increase in operating income over the same period. Rising fuel costs were a particular concern in 2018 and 2019 as they are the most significant operating cost. The number of full-time equivalent employees also rose by 32.1%, which matches the increase in capacity, but possibly greater economies of scale could have been realized. Some positive indicators are the increased average fleet utilization and average stage length. Longer flights are more profitable as there are proportionately fewer take-offs and landings.

**Royal Bank Canada**

Royal Bank Canada (RBC) is Canada’s largest bank and the 24th largest internationally, with a workforce of 85,000 employees, which earned a net income of 12.9 billion in 2019. It has CAD 1.4 trillion of total assets, consisting primarily of deposits, loans, and securities and administers another CAD 5.7 trillion for its 17 million clients in Canada, the U.S., and 34 other countries. Personal and commercial lending is RBC’s largest business segment, accounting for approximately half of its profits. The bank also operates capital markets, wealth management, investor and treasury services, and insurance units.

In the Selected Financial and Other Highlights section of its annual report, RBC provides its investors and other stakeholders with a summary of key financial results. This includes traditional and cash flow-based financial ratios, as well as risk management measures that are unique to the banking industry. The federal government’s Office of the Superintendent of Financial Institutions (OSFI) requires all Canadian banks to comply with Basel III. This international regulatory framework aims to ensure all financial institutions maintain sufficient short-term liquidity and capital adequacy. It also uses stress tests in various economic scenarios to avoid a repeat of the 2008 financial crisis.

**Exhibit 7: Risk Management Measures at Royal Bank Canada**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2019** | **2018** | **2017** | **2016** |
| **Loan Portfolio Performance** |  |  |  |  |
| Loans, net of allowance for loan losses (in CAD millions) | 618,856 | 576,818 | 542,617  | 521,604 |
| Provision for credit losses on loans (in CAD millions) | 1,864 | 1,307 | 1,150  | 1,546 |
| PCL on loans as a % of average net loans and acceptances | 0.31% | 0.23% | 0.21%  | 0.29% |
| PCL on performing loans as a % of average net loans and acceptances | 0.04% | 0.03% | 0.00% | 0.01% |
| PCL on impaired loans as a % of average net loans and acceptances | 0.27% | 0.20% | 0.21%  | 0.28% |
| Gross impaired loans as a % of loans and acceptances | 0.46% | 0.37% | 0.46%  | 0.73% |
| **Short-term Liquidity** |  |  |  |  |
| Liquidity coverage ratio | 127% | 123% | 122%  | 127% |
| **Capital Adequacy** |  |  |  |  |
| Risk-weighted assets (in CAD millions) | 512,856 | 496,459 | 474,478  | 449,712 |
| Common equity Tier 1 capital ratio | 12.1% | 11.5% | 10.9%  | 10.8% |
| Tier 1 capital ratio | 13.2% | 12.8% | 12.3%  | 12.3% |
| Total capital ratio | 15.2% | 14.6% | 14.2%  | 14.4% |
| Leverage ratio | 4.3% | 4.4% | 4.4%  | 4.4% |

**Loans, net allowance for loan losses.**  Total loan portfolio less an allowance for potential bad debts.

**Provision for credit losses on loans (PCL).** Amount charged to net income each year to bring the allowance for loan losses for both performing and impaired loans to the appropriate level as determined by management.

**Acceptances.** Loan guarantees for short-term trade credit provided by a bank in exchange for a “stamping fee.”

**Impaired loans.** Loans where the bank is no longer reasonably assured that principal and interest will be collected in full per the lending agreement.

**Gross impaired loans (GIL).** Impaired loans before deducting the allowance for loan losses.

**Liquidity coverage ratio (LCR).** High-quality liquid assets (HQLA) are divided by a bank’s average net cash outflows over 30 days. HQLA can be easily and immediately converted into cash with little or no loss of value during times of financial stress. OSFI requires a ratio of at least 1.0, which is the same as the Basel III requirement.

**Risk-weighted assets (RWA).** Asset values are adjusted based on their risk, with riskier assets receiving a higher weight as specified by OSFI. These adjustments force banks to carry more capital for their riskier assets.

**Common equity Tier 1 capital ratio (CET1).** CET1 divided by RWA. CET1 includes common shareholders’ equity less goodwill, intangible assets, deferred tax assets, pension assets, and other adjustments prescribed by the OSFI. OSFI currently requires a ratio of at least 7.0%, which includes a 2.5% capital conservation buffer over the Basel III requirement of 4.5%. Banks with larger common equity cushions are better equipped to pay their liabilities during periods of economic distress, when they are less likely to receive full value for their assets.

**Tier 1 capital ratio.** Tier 1 capital divided by RWA. Tier 1 capital is CET1 plus preferred shares, which do not require dividend payments and are therefore equivalent to common equity. OSFI requires a ratio of at least 8.5%, which includes a 2.5% capital conservation buffer over the Basel III requirement of 6.0%.

**Total capital ratio.** Total capital divided by RWA. Total capital comprises Tier 1 capital and Tier 2 capital. Tier 2 capital includes debentures that are subordinate to depositors and other creditors of the bank, and thus are similar to common equity. OSFI requires a ratio of at least 10.5%, which includes a 2.5% capital conservation buffer over the Basel III requirement of 8.0%.

**Leverage ratio.**  Tier 1 capital is divided by total bank assets, including specified off-balance sheet assets. OSFI requires a ratio of at least 3.0%.

RBC is currently experiencing no difficulties with its level of impaired loans and is complying with all Basel III short-term liquidity and capital adequacy requirements. Canada has a strong reputation globally for the security of its banking system and the rigour and professionalism of its financial regulators.