Learning Module 11: Financial Analysis Techniques

FINANCIAL STATEMENT ANALYSIS

Table of contents

Interpretation of Activity Ratios

Inventory Turnover

$$\text{Inventory Turnover} = \frac{\text{Cost of Sales or Cost of Goods Sold}}{\text{Average Inventory}}$$

Days of Inventory on Hand (DOH)

$$\text{DOH} = \frac{\text{Number of Days in Period}}{\text{Inventory Turnover}}$$

View Markdown Source

```
### Inventory Turnover

$$
\text{Inventory Turnover} =
\frac{\text{Cost of Sales or Cost of Goods Sold}}{\text{Average Inventory}}
$$

### Days of Inventory on Hand (DOH)

$$
\text{DOH} = \frac{\text{Number of Days in Period}}{\text{Inventory Turnover}}
$$
```

Inventory Turnover and DOH

- Inventory turnover indicates the resources tied up in inventory (i.e., the carrying costs) and, therefore, can be used to indicate inventory management effectiveness.
- In general, inventory turnover and DOH (days of inventory on hand) should be benchmarked against industry norms.
- A high inventory turnover ratio relative to industry norms might indicate highly effective inventory management.
- Alternatively, a high inventory turnover ratio (and commensurately low DOH) could possibly indicate the company does not carry adequate inventory, so shortages could potentially hurt revenue.
- To assess which explanation is more likely, the analyst can compare the company's revenue growth with that of the industry. Slower growth combined with higher inventory turnover could indicate inadequate inventory levels. Revenue growth at or above the industry's growth supports the interpretation that the higher turnover reflects greater inventory management efficiency.

- A low inventory turnover ratio (and commensurately high DOH) relative to the rest of the industry could be an indicator of slow-moving inventory, perhaps because of technological obsolescence or a change in fashion. Again, comparing the company's sales growth with the industry can offer insight.

Receivables Turnover

$$\text{Receivables Turnover} = \frac{\text{Revenue}}{\text{Average Receivables}}$$

Days of Sales Outstanding (DSO)

$$\text{DSO} = \frac{\text{Number of Days in Period}}{\text{Receivables Turnover}}$$

View Markdown Source

```
### Receivables Turnover

$$
\text{Receivables Turnover} =
\frac{\text{Revenue}}{\text{Average Receivables}}
$$


### Days of Sales Outstanding (DSO)

$$
\text{DSO} =
\frac{\text{Number of Days in Period}}{\text{Receivables Turnover}}
$$
```

Interpretation of Receivables Turnover and DSO

- The number of DSO (days of sales outstanding) reflects how fast the company collects cash from customers to whom it offers credit. Although limiting the numerator to sales made on credit in the receivables turnover would be more appropriate, credit sales information is usually not available to analysts; therefore, revenue as reported in the income statement is generally used.

- As with inventory management, comparison of the company's sales growth relative to the industry can help the analyst assess whether sales are being lost due to stringent credit policies.

- In addition, comparing the company's estimates of uncollectible accounts receivable and actual credit losses with past experience and with peer companies can help assess whether low turnover reflects credit management issues.

- Companies often provide details of receivables aging (how much receivables have been outstanding by age). This can be used along with DSO to understand trends in collection.

Payables Turnover

$$\text{Payables Turnover} = \frac{\text{Cost of Sales or Cost of Goods Sold}}{\text{Average Trade Payables}}$$

Number of Days of Payables

$$\text{Number of Days of Payables} = \frac{\text{Number of Days in Period}}{\text{Payables Turnover}}$$

View Markdown Source

```
### Payables Turnover

$$
\text{Payables Turnover} =
\frac{\text{Cost of Sales or Cost of Goods Sold}}{\text{Average Trade Payables}}
$$
```

```
### Number of Days of Payables

$$
\text{Number of Days of Payables} =
\frac{\text{Number of Days in Period}}{\text{Payables Turnover}}
$$
```

Interpretation of Payables Turnover and the Number of Days of Payables

- The number of days of payables reflects the average number of days the company takes to pay its suppliers, and the payables turnover ratio measures how many times per year the company theoretically pays off all its creditors.

- A payables turnover ratio that is high (low days payable) relative to the industry could indicate that the company is not making full use of available credit facilities; alternatively, it could result from a company taking advantage of early payment discounts.

- An excessively low turnover ratio (high days payable) could indicate trouble making payments on time, or alternatively, exploitation of lenient supplier terms.
- This is another example in which it is useful to look simultaneously at other ratios. If liquidity ratios indicate that the company has sufficient cash and other short-term assets to pay obligations and yet the days payable ratio is relatively high, the analyst would favor the lenient supplier credit and collection policies as an explanation.

Working Capital Turnover

$$\text{Working Capital Turnover} = \frac{\text{Revenue}}{\text{Average Working Capital}}$$

- Working capital turnover indicates how efficiently the company generates revenue with its working capital.

- For example, a working capital turnover ratio of 4.0 indicates that the company generates EUR4 of revenue for every EUR1 of working capital. A high working capital turnover ratio indicates greater efficiency (i.e., the company is generating a high level of revenues relative to working capital).

- For some companies, working capital can be near zero or negative, rendering this ratio incapable of being interpreted.

- Fixed Asset Turnover and Total Asset Turnover ratios are more useful in those circumstances.

View Markdown Source

```
### Working Capital Turnover

$$
\text{Working Capital Turnover} =
\frac{\text{Revenue}}{\text{Average Working Capital}}
$$

- Working capital turnover indicates how efficiently the company generates
  revenue with its working capital.
- For example, a working capital turnover ratio of 4.0 indicates that the
  company generates EUR4 of revenue for every EUR1 of working capital. A high
  working capital turnover ratio indicates greater efficiency (i.e., the
  company is generating a high level of revenues relative to working capital).
- For some companies, working capital can be near zero or negative, rendering
  this ratio incapable of being interpreted.
- Fixed Asset Turnover and Total Asset Turnover ratios are more useful in those
  circumstances.
```

Fixed Asset Turnover

$$\text{Fixed Asset Turnover} = \frac{\text{Revenue}}{\text{Average Net Fixed Assets}}$$

- This ratio measures how efficiently the company generates revenues from its investments in fixed assets.

- Generally, a higher fixed asset turnover ratio indicates more efficient use of fixed assets in generating revenue.

- A low ratio can indicate inefficiency, a capital-intensive business environment, or a new business not yet operating at full capacity—in which case the analyst will not be able to link the ratio directly to efficiency.

- In addition, asset turnover can be affected by factors other than a company's efficiency. The fixed asset turnover ratio would be lower for a company whose assets are newer (and, therefore, less depreciated and so reflected in the financial statements at a higher carrying value) than the ratio for a company with older assets (that are thus more depreciated and so reflected at a lower carrying value).

- The fixed asset ratio can be erratic because, although revenue may have a steady growth rate, increases in fixed assets may not follow a smooth pattern; so, every year-to-year change in the ratio does not necessarily indicate important changes in the company's efficiency.

View Markdown Source

```
### Fixed Asset Turnover

$$
\text{Fixed Asset Turnover} =
\frac{\text{Revenue}}{\text{Average Net Fixed Assets}}
$$

- This ratio measures how efficiently the company generates revenues from its
  investments in fixed assets.
- Generally, a higher fixed asset turnover ratio indicates more efficient use
  of fixed assets in generating revenue.
- A low ratio can indicate inefficiency, a capital-intensive business
  environment, or a new business not yet operating at full capacity-in which
  case the analyst will not be able to link the ratio directly to efficiency.
- In addition, asset turnover can be affected by factors other than a company's
  efficiency. The fixed asset turnover ratio would be lower for a company
  whose assets are newer (and, therefore, less depreciated and so reflected in
  the financial statements at a higher carrying value) than the ratio for a
  company with older assets (that are thus more depreciated and so reflected
  at a lower carrying value).
- The fixed asset ratio can be erratic because, although revenue may have a
  steady growth rate, increases in fixed assets may not follow a smooth pattern;
  so, every year-to-year change in the ratio does not necessarily indicate
  important changes in the company's efficiency.
```

Total Asset Turnover

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

- The total asset turnover ratio measures the company's overall ability to generate revenues with a given level of assets.
- A ratio of 1.20 would indicate that the company is generating EUR1.20 of revenues for every EUR1 of average assets. A higher ratio indicates greater efficiency.
- Because this ratio includes both fixed and current assets, inefficient working capital management can distort overall interpretations. It is therefore helpful to analyze working capital and fixed asset turnover ratios separately.
- A low asset turnover ratio can be an indicator of inefficiency or of relative capital intensity of the business.
- The ratio also reflects strategic decisions by management—for example, the decision whether to use a more labor-intensive (and less capital-intensive) approach to its business or a more capital-intensive (and less labor-intensive) approach.
- When interpreting activity ratios, the analysts should examine not only the individual ratios but also the collection of relevant ratios to determine the overall efficiency of a company.

View Markdown Source

```
### Total Asset Turnover

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

- The total asset turnover ratio measures the company's overall ability to
  generate revenues with a given level of assets.
- A ratio of 1.20 would indicate that the company is generating EUR1.20 of
  revenues for every EUR1 of average assets. A higher ratio indicates greater
  efficiency.
- Because this ratio includes both fixed and current assets, inefficient
  working capital management can distort overall interpretations. It is
  therefore helpful to analyze working capital and fixed asset turnover ratios
  separately.
```

```
- A low asset turnover ratio can be an indicator of inefficiency or of relative
  capital intensity of the business.
- The ratio also reflects strategic decisions by management-for example, the
  decision whether to use a more labor-intensive (and less capital-intensive)
  approach to its business or a more capital-intensive (and less
  labor-intensive) approach.
- When interpreting activity ratios, the analysts should examine not only the
  individual ratios but also the collection of relevant ratios to determine
  the overall efficiency of a company.
```

Interpretation of Liquidity Ratios

Current Ratio

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

- A higher current ratio indicates a higher level of liquidity (i.e., a greater ability to meet short-term obligations). A lower ratio indicates less liquidity, implying a greater reliance on operating cash flow and outside financing to meet short-term obligations.
- The current ratio implicitly assumes that inventories and accounts receivable are indeed liquid (which is presumably not the case when related turnover ratios are low).

View Markdown Source

```
### Current Ratio

$$
\text{Current Ratio} =
\frac{\text{Current Assets}}{\text{Current Liabilities}}
$$

- A higher current ratio indicates a higher level of liquidity (i.e., a greater
  ability to meet short-term obligations). A lower ratio indicates less
  liquidity, implying a greater reliance on operating cash flow and outside
  financing to meet short-term obligations.
```

```
- The current ratio implicitly assumes that inventories and accounts receivable
  are indeed liquid (which is presumably not the case when related turnover
  ratios are low).
```

Quick Ratio

$$\text{Quick Ratio} = \frac{\substack{\text{Cash + Short-term Marketable} \\ \text{Investments + Receivables}}}{\text{Current Liabilities}}$$

- The quick ratio is more conservative than the current ratio because it includes only the more liquid current assets (sometimes referred to as "quick assets") in relation to current liabilities.

- Like the current ratio, a higher quick ratio indicates greater liquidity.

- The quick ratio reflects the fact that certain current assets—such as prepaid expenses, some taxes, and employee-related prepayments—represent costs of the current period that have been paid in advance and cannot usually be converted back into cash.

- This ratio also reflects the fact that inventory might not be easily and quickly converted into cash, and furthermore, that a company probably would not be able to sell all of its inventory for an amount equal to its carrying value, especially if it were required to sell the inventory quickly.

- In situations in which inventories are illiquid (as indicated, for example, by low inventory turnover ratios), the quick ratio may be a better indicator of liquidity than the current ratio.

View Markdown Source

```
### Quick Ratio

$$
\text{Quick Ratio} =
\frac{\substack{\text{Cash + Short-term Marketable }
\\\text{Investments + Receivables}}}{\text{Current Liabilities}}
$$

- The quick ratio is more conservative than the current ratio because it
```

```
  includes only the more liquid current assets (sometimes referred to as "quick
  assets") in relation to current liabilities.
- Like the current ratio, a higher quick ratio indicates greater liquidity.
- The quick ratio reflects the fact that certain current assets-such as prepaid
  expenses, some taxes, and employee-related prepayments-represent costs of the
  current period that have been paid in advance and cannot usually be converted
  back into cash.
- This ratio also reflects the fact that inventory might not be easily and
  quickly converted into cash, and furthermore, that a company probably would
  not be able to sell all of its inventory for an amount equal to its carrying
  value, especially if it were required to sell the inventory quickly.
- In situations in which inventories are illiquid (as indicated, for example,
  by low inventory turnover ratios), the quick ratio may be a better indicator
  of liquidity than the current ratio.
```

Cash Ratio

$$\text{Cash Ratio} = \frac{\substack{\text{Cash + Short-term} \\ \text{Marketable Investments}}}{\text{Current Liabilities}}$$

- The cash ratio normally represents a reliable measure of an entity's liquidity in a crisis situation. Only highly marketable short-term investments and cash are included.

- In a general market crisis, the fair value of marketable securities could decrease significantly as a result of market factors, in which case even this ratio might not provide reliable information.

View Markdown Source

```
### Cash Ratio

$$
\text{Cash Ratio} =
\frac{\substack{\text{Cash + Short-term }
\\\text{Marketable Investments}}}{\text{Current Liabilities}}
$$

- The cash ratio normally represents a reliable measure of an entity's
  liquidity in a crisis situation. Only highly marketable short-term investments
  and cash are included.
- In a general market crisis, the fair value of marketable securities could
  decrease significantly as a result of market factors, in which case even this
  ratio might not provide reliable information.
```

Defensive Interval Ratio

$$\substack{\text{Defensive } \\ \text{Interval Ratio}} = \frac{\substack{\text{Cash + Short-term Marketable} \\ \text{Investments + Receivables}}}{\text{Daily Cash Expenditures}}$$

- The defensive interval ratio measures how long the company can continue to pay its expenses from its existing liquid assets without receiving any additional cash inflow.
- A defensive interval ratio of 50 would indicate that the company can continue to pay its operating expenses for 50 days before running out of quick assets, assuming no additional cash inflows.
- A higher defensive interval ratio indicates greater liquidity.
- If a company's defensive interval ratio is very low relative to peer companies or to the company's own history, the analyst would want to ascertain whether there is sufficient cash inflow expected to mitigate the low defensive interval ratio.

View Markdown Source

```
### Defensive Interval Ratio

$$
\substack{\text{Defensive } \\\text{Interval Ratio}} =
\frac{\substack{\text{Cash + Short-term Marketable }
\\\text{Investments + Receivables}}}{\text{Daily Cash Expenditures}}
$$

- The defensive interval ratio measures how long the company can continue to
  pay its expenses from its existing liquid assets without receiving any
  additional cash inflow.
- A defensive interval ratio of 50 would indicate that the company can continue
  to pay its operating expenses for 50 days before running out of quick assets,
  assuming no additional cash inflows.
- A higher defensive interval ratio indicates greater liquidity.
- If a company's defensive interval ratio is very low relative to peer
  companies or to the company's own history, the analyst would want to
  ascertain whether there is sufficient cash inflow expected to mitigate the
  low defensive interval ratio.
```

Cash Conversion Cycle (Net Operating Cycle)

$$\substack{\text{Cash Conversion Cycle} \\\text{(Net Operating Cycle)}} = \substack{\text{DOH } + \text{ DSO } - \text{ Number} \\\text{ of Days of Payables}}$$

- This cash conversion cycle metric indicates the amount of time that elapses from the point when a company invests in working capital until the point at which the company collects cash.
- A shorter cash conversion cycle indicates greater liquidity.
- A short cash conversion cycle implies that the company only needs to finance its inventory and accounts receivable for a short period of time.
- A longer cash conversion cycle indicates lower liquidity; it implies that the company must finance its inventory and accounts receivable for a longer period of time, possibly indicating a need for a higher level of capital to fund current assets.

View Markdown Source

```
### Cash Conversion Cycle (Net Operating Cycle)

$$
\substack{\text{Cash Conversion Cycle} \\\text{(Net Operating Cycle)}} =
\substack{\text{DOH } + \text{ DSO } - \text{ Number}
\\\text{ of Days of Payables}}
$$

- This cash conversion cycle metric indicates the amount of time that elapses
  from the point when a company invests in working capital until the point at
  which the company collects cash.
- A shorter cash conversion cycle indicates greater liquidity.
- A short cash conversion cycle implies that the company only needs to finance
  its inventory and accounts receivable for a short period of time.
- A longer cash conversion cycle indicates lower liquidity; it implies that the
  company must finance its inventory and accounts receivable for a longer
  period of time, possibly indicating a need for a higher level of capital to
  fund current assets.
```

Interpretation of Solvency Ratios

`Solvency ratios` measure a company's ability to meet long-term obligations. Subsets of these ratios are also known as "leverage" and "long-term debt" ratios.

Solvency refers to a company's ability to fulfill its long-term debt obligations.

The two primary types of solvency ratios are **debt ratios** and **coverage ratios**.
- *Debt ratios* focus on the balance sheet and measure the amount of debt capital relative to equity capital.
- *Coverage ratios* focus on the income statement and measure the ability of a company to cover its debt payments.

These ratios are useful in assessing a company's solvency and, therefore, in evaluating the quality of a company's bonds and other debt obligations.

In the following, we discuss the interpretation of the basic solvency ratios presented in this module: Exhibit 25.

Debt Ratio: Debt-to-Assets Ratio

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

- This ratio measures the percentage of total assets financed with debt. For example, a debt-to-assets ratio of 0.40 or 40 percent indicates that 40 percent of the company's assets are financed with debt. Generally, higher debt means higher financial risk and thus weaker solvency.

- "Total debt ratio" is another name sometimes used for this ratio.

- In this reading, total debt is the sum of interest-bearing short-term and long-term debt.

View Markdown Source

```
### Debt Ratio: Debt-to-Assets Ratio

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

- This ratio measures the percentage of total assets financed with debt. For
  example, a debt-to-assets ratio of 0.40 or 40 percent indicates that 40
  percent of the company's assets are financed with debt. Generally, higher
  debt means higher financial risk and thus weaker solvency.
- "Total debt ratio" is another name sometimes used for this ratio.
- In this reading, total debt is the sum of interest-bearing short-term and
  long-term debt.
```

Debt Ratio: Debt-to-Capital Ratio

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

- The debt-to-capital ratio measures the percentage of a company's capital (debt plus equity) represented by debt. As with the previous ratio, a higher ratio generally means higher financial risk and thus indicates weaker solvency.

- In this reading, total debt is the sum of interest-bearing short-term and long-term debt.

View Markdown Source

```
### Debt Ratio: Debt-to-Capital Ratio

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

- The debt-to-capital ratio measures the percentage of a company's capital
  (debt plus equity) represented by debt. As with the previous ratio, a higher
  ratio generally means higher financial risk and thus indicates weaker solvency.
- In this reading, total debt is the sum of interest-bearing short-term and
  long-term debt.
```

Debt Ratio: Debt-to-Equity Ratio

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

- The debt-to-equity ratio measures the amount of debt capital relative to equity capital. Interpretation is similar to the preceding two ratios (i.e., a higher ratio indicates weaker solvency). A ratio of 1.0 would indicate equal amounts of debt and equity, which is equivalent to a debt-to-capital ratio of 50 percent. Alternative definitions of this ratio use the market value of stockholders' equity rather than its book value (or use the market values of both stockholders' equity and debt).

- In this reading, total debt is the sum of interest-bearing short-term and long-term debt.

View Markdown Source

```
### Debt Ratio: Debt-to-Equity Ratio

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

- The debt-to-equity ratio measures the amount of debt capital relative to
  equity capital. Interpretation is similar to the preceding two ratios (i.e.,
  a higher ratio indicates weaker solvency). A ratio of 1.0 would indicate
  equal amounts of debt and equity, which is equivalent to a debt-to-capital
  ratio of 50 percent. Alternative definitions of this ratio use the market
  value of stockholders' equity rather than its book value (or use the market
  values of both stockholders' equity and debt).
- In this reading, total debt is the sum of interest-bearing short-term and
  long-term debt.
```

Debt Ratio: Financial Leverage Ratio

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

- The financial leverage ratio (often called simply the "leverage ratio") measures the amount of total assets supported for each one money unit of equity. For example, a value of 3 for this ratio means that each EUR1 of equity supports EUR3 of total assets.

- The higher the financial leverage ratio, the more leveraged the company is in the sense of using debt and other liabilities to finance assets. This ratio is often defined in terms of average total assets and average total equity.

- [c]: Average total assets divided by average total equity is used for the purposes of this reading (in particular, Dupont analysis covered later). In practice, period-end total assets divided by period-end total equity is often used.

View Markdown Source

```
### Debt Ratio: Financial Leverage Ratio

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

- The financial leverage ratio (often called simply the "leverage ratio")
  measures the amount of total assets supported for each one money unit of
  equity. For example, a value of 3 for this ratio means that each EUR1 of
  equity supports EUR3 of total assets.
- The higher the financial leverage ratio, the more leveraged the company is
  in the sense of using debt and other liabilities to finance assets.
  This ratio is often defined in terms of average total assets and average
  total equity.
- $^c$: Average total assets divided by average total equity is used for the
  purposes of this reading (in particular, Dupont analysis covered later). In
  practice, period-end total assets divided by period-end total equity is often
  used.
```

Debt Ratio: Debt-to-EBITDA Ratio

$$\text{Debt-to-EBITDA} = \frac{\text{Total or net debt}}{\text{EBITDA}}$$

- The debt-to-EBITDA ratio estimates how many years it would take to repay total debt based on earnings before income taxes, depreciation, and amortization

(an approximation of operating cash flow). This ratio is commonly used in debt covenants between issuers and debt investors.

View Markdown Source

```
### Debt Ratio: Debt-to-EBITDA Ratio

$$
\text{Debt-to-EBITDA} = \frac{\text{Total or net debt}}{\text{EBITDA}}
$$

- The debt-to-EBITDA ratio estimates how many years it would take to repay
  total debt based on earnings before income taxes, depreciation, and
  amortization (an approximation of operating cash flow). This ratio is
  commonly used in debt covenants between issuers and debt investors.
```

Coverage Ratio: Interest Coverage

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

- The interest coverage ratio measures the number of times a company's EBIT could cover its interest payments. Thus, it is sometimes referred to as "times interest earned."

- A higher interest coverage ratio indicates stronger solvency, offering greater assurance that the company can service its debt (i.e., bank debt, bonds, notes) from operating earnings. This ratio is commonly used in debt covenants between issuers and lenders or fixed income investors.

View Markdown Source

```
### Coverage Ratio: Interest Coverage

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

- The interest coverage ratio measures the number of times a company's
  EBIT could cover its interest payments. Thus, it is sometimes referred to
  as "times interest earned."
```

```
- A higher interest coverage ratio indicates stronger solvency, offering
  greater assurance that the company can service its debt (i.e., bank debt,
  bonds, notes) from operating earnings. This ratio is commonly used in debt
  covenants between issuers and lenders or fixed income investors.
```

Coverage Ratio: Fixed Charge Coverage

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

- The fixed charge coverage ratio relates fixed charges, or obligations, to the cash flow generated by the company. It measures the number of times a company's earnings (before interest, taxes, and lease payments) can cover the company's interest and lease payments.
- Similar to the interest coverage ratio, a higher fixed charge coverage ratio implies stronger solvency, offering greater assurance that the company can service its debt (i.e., bank debt, bonds, notes, and leases) from normal earnings. The ratio is sometimes used as an indication of the quality of the preferred dividend, with a higher ratio indicating a more secure preferred dividend.

View Markdown Source

```
### Coverage Ratio: Fixed Charge Coverage

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

- The fixed charge coverage ratio relates fixed charges, or obligations, to
  the cash flow generated by the company. It measures the number of times a
  company's earnings (before interest, taxes, and lease payments) can cover
  the company's interest and lease payments.
- Similar to the interest coverage
  ratio, a higher fixed charge coverage ratio implies stronger solvency,
  offering greater assurance that the company can service its debt (i.e., bank
  debt, bonds, notes, and leases) from normal earnings. The ratio is sometimes
  used as an indication of the quality of the preferred dividend, with a higher
  ratio indicating a more secure preferred dividend.
```

Interpretation of Profitability Ratios

`Profitability ratios` measure the company's ability to generate profits from its resources (assets) or sales.

Return-on-sales profitability ratios express various subtotals on the income statement (e.g., gross profit, operating profit, net profit) as a percentage of revenue.

Return on investment profitability ratios measure income relative to assets, equity, or total capital employed by the company.

In the following, we discuss the interpretation of the profitability ratios presented in this module: Exhibit 27. For each of the profitability ratios, a higher ratio indicates greater profitability.

Return-on-sales: Gross Profit Margin

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

- Gross profit margin indicates the percentage of revenue available to cover operating and other expenses and to generate profit. Higher gross profit margin indicates some combination of higher product pricing and lower product costs. The ability to charge a higher price is constrained by competition, so gross profits are affected by (and usually inversely related to) competition. If a product has a competitive advantage (e.g., superior branding, better quality, or exclusive technology), the company is better able to charge more for it. On the cost side, higher gross profit margin can also indicate that a company has a competitive advantage in product costs.

View Markdown Source

```
### Return-on-sales: Gross Profit Margin

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

- Gross profit margin indicates the percentage of revenue available to cover
  operating and other expenses and to generate profit. Higher gross profit
  margin indicates some combination of higher product pricing and lower
```

```
  product costs. The ability to charge a higher price is constrained by
  competition, so gross profits are affected by (and usually inversely related
  to) competition. If a product has a competitive advantage (e.g., superior
  branding, better quality, or exclusive technology), the company is better
  able to charge more for it. On the cost side, higher gross profit margin can
  also indicate that a company has a competitive advantage in product costs.
```

Return-on-sales: Operating Profit Margin

$$\text{Operating profit margin} = \frac{\text{profit from operations}}{\text{revenue}}$$

- Operating profit is calculated as gross profit minus operating costs. So, an operating profit margin increasing faster than the gross profit margin can indicate improvements in controlling operating costs, such as administrative overheads. In contrast, a declining operating profit margin could be an indicator of deteriorating control over operating costs.

View Markdown Source

```
### Return-on-sales: Operating Profit Margin

$$
\text{Operating profit margin} = \frac{\text{profit from operations}}
{\text{revenue}}
$$

- Operating profit is calculated as gross profit minus operating costs. So,
  an operating profit margin increasing faster than the gross profit margin
  can indicate improvements in controlling operating costs, such as
  administrative overheads. In contrast, a declining operating profit margin
  could be an indicator of deteriorating control over operating costs.
```

Return-on-sales: Pretax Margin

$$\text{pretax margin} = \frac{\text{EBT}}{\text{revenue}}$$

- EBT: earnings before tax but after interest.

- Pretax income (also called "earnings before tax" or EBT) is calculated as operating profit minus interest, and the pretax margin is the ratio of pretax income to revenue. The pretax margin reflects the effects on profitability of leverage and other (non-operating) income and expenses. If a company's pretax margin is increasing primarily as a result of increasing amounts of non-operating income, the analyst should evaluate whether this increase reflects a deliberate change in a company's business focus and, therefore, the likelihood that the increase will continue.

View Markdown Source

```
### Return-on-sales: Pretax Margin

$$
\text{pretax margin} = \frac{\text{EBT}}{\text{revenue}}
$$

- EBT: earnings before tax but after interest.
- Pretax income (also called "earnings before tax" or EBT) is calculated as
  operating profit minus interest, and the pretax margin is the ratio of pretax
  income to revenue. The pretax margin reflects the effects on profitability
  of leverage and other (non-operating) income and expenses. If a company's
  pretax margin is increasing primarily as a result of increasing amounts of
  non-operating income, the analyst should evaluate whether this increase
  reflects a deliberate change in a company's business focus and, therefore,
  the likelihood that the increase will continue.
```

Return-on-sales: Net Profit Margin

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

- Net Profit Margin, also known as profit margin and return on sales.

- Net profit, or net income, is calculated as revenue minus all expenses. Net income includes both recurring and non-recurring components. Generally, the net income used in calculating the net profit margin is adjusted for non-recurring items to offer a better view of a company's potential future profitability.

View Markdown Source

```
### Return-on-sales: Net Profit Margin

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

- Net Profit Margin, also known as profit margin and return on sales.
- Net profit, or net income, is calculated as revenue minus all expenses.
  Net income includes both recurring and non-recurring components. Generally,
  the net income used in calculating the net profit margin is adjusted for
  non-recurring items to offer a better view of a company's potential future
  profitability.
```

Return on Investment: Return on Assets (ROA) - Part I

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

- Return on Assets(ROA) measures the return earned by a company on its assets. The higher the ratio, the more income is generated by a given level of assets.

- An issue with this computation is that net income is the return to equity holders, whereas assets are financed by both equity holders and creditors. Interest expense (the return to creditors) has already been subtracted in the numerator.

View Markdown Source

```
### Return on Investment: Return on Assets (ROA) - Part I

$$
\text{Return on Assets} =
\frac{\text{Net Income}}{\text{Average Total Assets}}
$$
```

```
- Return on Assets(ROA) measures the return earned by a company on its assets.
  The higher the   ratio, the more income is generated by a given level of
  assets.
- An issue with this computation is that net income is the return to equity
  holders, whereas assets are financed by both equity holders and creditors.
  Interest expense (the return to creditors) has already been subtracted in
  the numerator.
```

Return on Investment: Return on Assets (ROA) - Part II

$$\text{Return on Assets} = \frac{\text{Net Income} + \text{Interest expense}(1 - \text{Tax rate})}{\text{Average Total Assets}}$$

- Some analysts, therefore, prefer to add back interest expense in the numerator. In such cases, interest must be adjusted for income taxes because net income is determined after taxes.

View Markdown Source

```
### Return on Investment: Return on Assets (ROA) - Part II

$$
\text{Return on Assets} =
\frac{\text{Net Income} + \text{Interest expense}(1- \text{Tax rate})
}{\text{Average Total Assets}}
$$

- Some analysts, therefore, prefer to add back interest expense in the
  numerator. In such cases, interest must be adjusted for income taxes because
  net income is determined after taxes.
```

Return on Investment: Operating ROA - Part III - Pre-Interest and Pre-Tax

$$\text{Return on Assets} = \frac{\text{Operating Income or EBIT}}{\text{Average Total Assets}}$$

- In this ROA calculation, returns are measured prior to deducting interest on debt capital (i.e., as operating income or EBIT). This measure reflects the return on all assets invested in the company, whether financed with liabilities, debt, or equity.

View Markdown Source

```
### Return on Investment: Operating ROA - Part III - Pre-Interest and Pre-Tax

$$
\text{Return on Assets} =
\frac{\text{Operating Income or EBIT}}{\text{Average Total Assets}}
$$

- In this ROA calculation, returns are measured prior to deducting interest on
  debt capital (i.e., as operating income or EBIT). This measure reflects the
  return on all assets invested in the company, whether financed with
  liabilities, debt, or equity.
```

Return on Investment: Return on Invested Capital (ROIC)

$$\text{ROIC} = \frac{\text{EBIT} \times (1 - \text{Effective Tax Rate})}{\substack{\text{Average total short-term and} \\ \text{long-term debt and equity}}}$$

- ROIC measures the after-tax profitability a company earns on all of the capital that it employs (short-term debt, long-term debt, and equity). As with operating ROA, returns are measured prior to deducting interest on debt capital (i.e., as operating income or EBIT).

View Markdown Source

```
### Return on Investment: Return on Invested Capital (ROIC)

$$
\text{ROIC} = \frac{\text{EBIT} \times (1- \text{Effective Tax Rate})
}{\substack{\text{Average total short-term and}
\\\text{long-term debt and equity}}}
$$

- ROIC measures the after-tax profitability a company earns on all of the
  capital that it employs (short-term debt, long-term debt, and equity). As
  with operating ROA, returns are measured prior to deducting interest on debt
  capital (i.e., as operating income or EBIT).
```

Return on Investment: Return on Equity (ROE)

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

- ROE measures the return earned by a company on its equity capital, including minority equity, preferred equity, and common equity. As noted, return is measured as net income (i.e., interest on debt capital is not included in the return on equity capital).

View Markdown Source

```
### Return on Investment: Return on Equity (ROE)

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

- ROE measures the return earned by a company on its equity capital, including
  minority equity, preferred equity, and common equity. As noted, return is
  measured as net income (i.e., interest on debt capital is not included in the
  return on equity capital).
```

Return on Investment: Return on Common Equity - ROCE

$$\text{ROCE} = \frac{\text{Net Income - Preferred dividends}}{\text{Average Common Equity}}$$

- A variation of ROE is return on common equity, which measures the return earned by a company only on its common equity.

View Markdown Source

```
### Return on Investment: Return on Common Equity - ROCE

$$
\text{ROCE} = \frac{\text{Net Income - Preferred dividends}}{
\text{Average Common Equity}}
$$

- A variation of ROE is return on common equity, which measures the return
  earned by a company only on its common equity.
```

DUPONT ANALYSIS—THE DECOMPOSITION OF ROE

Expressing ROE as a product of only two of its components

$$\text{ROE} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

$$= \frac{\text{Net Income}}{\text{Average total assets}} \times \frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}} \tag{1}$$

which can be interpreted as follows:

$$\text{ROE} = \text{ROA} \times \text{Leverage}$$

- In other words, ROE is a function of a company's ROA and its use of financial leverage ("leverage" for short, in this discussion).
- A company can improve its ROE by improving ROA or by increasing leverage.
- Consistent with the definition given in this module, leverage is measured as average total assets divided by average shareholders' equity.
- if a company had no leverage (no liabilities), its leverage ratio would equal 1.0 and ROE would exactly equal ROA.
- As a company takes on liabilities, its leverage increases.
- As long as a company is able to borrow at a rate lower than the marginal rate it can earn investing the borrowed money, the company is making an effective use of leverage and ROE would increase as leverage increases.
- If a company's borrowing cost exceeds the marginal rate it can earn on investing in the business, ROE would decline as leverage increased because the effect of borrowing would be to depress ROA.

View Markdown Source

```
### Expressing ROE as a product of only two of its components

$$
\text{ROE} =
\frac{\text{Net Income}}{\text{Average Total Assets}}
$$

$$
= \frac{\text{Net Income}}{\text{Average total assets}} \times
\frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}} \tag{1}
$$

which can be interpreted as follows:

$$
\text{ROE} = \text{ROA} \times \text{Leverage}
$$

- In other words, ROE is a function of a company's ROA and its use of financial
  leverage ("leverage" for short, in this discussion).
- A company can improve its ROE by improving ROA or by increasing leverage.
- Consistent with the definition given in this module, leverage is measured as
  average total assets divided by average shareholders' equity.
- if a company had no leverage (no liabilities), its leverage ratio would equal
  1.0 and ROE would exactly equal ROA.
- As a company takes on liabilities, its leverage increases.
- As long as a company is able to borrow at a rate lower than the marginal rate
  it can earn investing the borrowed money, the company is making an effective
  use of leverage and ROE would increase as leverage increases.
- If a company's borrowing cost exceeds the marginal rate it can earn on
  investing in the business, ROE would decline as leverage increased because
  the effect of borrowing would be to depress ROA.
```

Expressing ROE as a product of three component ratios

$$\frac{\text{Net Income}}{\text{Average Shareholders' Equity}} = \frac{\text{Net Income}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Average Total Assets}} \tag{2}$$

$$\times \frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}}$$

which can be interpreted as follows:

$$\text{ROE} = \substack{\text{Net profit} \\ \text{margin}} \times \substack{\text{Total asset} \\ \text{turnover}} \times \text{leverage}$$

- The first term on the right-hand side of this equation is the net profit margin, an indicator of profitability: how much income a company derives per one monetary unit (e.g., euro or US dollar) of sales.

- The second term on the right is the asset turnover ratio, an indicator of efficiency: how much revenue a company generates per one money unit of assets. Note that ROA is decomposed into these two components: net profit margin and total asset turnover. A company's ROA is a function of profitability (net profit margin) and efficiency (total asset turnover).

- The third term on the right-hand side of the equation is a measure of financial leverage, an indicator of solvency: the total amount of a company's assets relative to its equity capital.
- This decomposition illustrates that a company's ROE is a function of its net profit margin, its efficiency, and its leverage.

View Markdown Source

```
### Expressing ROE as a product of three component ratios

$$
\frac{\text{Net Income}}{\text{Average Shareholders' Equity}} =
\frac{\text{Net Income}}{\text{Revenue}} \times
\frac{\text{Revenue}}{\text{Average Total Assets}} \tag{2}
$$

$$
\times \frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}}
$$

which can be interpreted as follows:

$$
\text{ROE} = \substack{\text{Net profit} \\\text{margin}} \times
\substack{\text{Total asset} \\\text{turnover}} \times \text{leverage}
$$

- The first term on the right-hand side of this equation is the net profit
  margin, an indicator of profitability: how much income a company derives per
  one monetary unit (e.g., euro or US dollar) of sales.
```

```
- The second term on the right is the asset turnover ratio, an indicator of
  efficiency: how much revenue a company generates per one money unit of assets.
  Note that ROA is decomposed into these two components: net profit margin and
  total asset turnover. A company's ROA is a function of profitability (net
  profit margin) and efficiency (total asset turnover).
- The third term on the right-hand side of the equation is a measure of
  financial leverage, an indicator of solvency: the total amount of a company's
  assets relative to its equity capital.
- This decomposition illustrates that a company's ROE is a function of its net
  profit margin, its efficiency, and its leverage.
```

Expressing ROE - five-way decomposition

$$\begin{aligned}\frac{\text{Net income}}{\text{Average Shareholders' Equity}} &= \frac{\text{Net Income}}{\text{EBT}} \times \frac{\text{EBT}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{Revenue}} \\ &\times \frac{\text{Revenue}}{\text{Average Total Assets}} \quad \times \frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}}\end{aligned} \tag{3}$$

which can be interpreted as follows:

ROE = Tax burden × Interest burden × EBIT margin × Total asset turnover × Leverage

- This five-way decomposition is the one found in financial databases such as Bloomberg.

- The first term on the right-hand side of this equation measures the effect of taxes on ROE. Essentially, it reflects one minus the average tax rate, or how much of a company's pretax profits it gets to keep. This can be expressed in decimal or percentage form. So, a 30 percent tax rate would yield a factor of 0.70 or 70 percent. A higher value for the tax burden implies that the company can keep a higher percentage of its pretax profits, indicating a lower tax rate. A decrease in the tax burden ratio implies the opposite (i.e., a higher tax rate leaving the company with less of its pretax profits).

- The second term on the right-hand side captures the effect of interest on ROE. Higher borrowing costs reduce ROE. Some analysts prefer to use operating income instead of EBIT for this term and the following term. Either operating income or EBIT is acceptable as long as it is applied consistently. In such a case, the second term would measure both the effect of interest expense and non-operating income

on ROE.

- The third term on the right-hand side captures the effect of operating margin (if operating income is used in the numerator) or EBIT margin (if EBIT is used) on ROE. In either case, this term primarily measures the effect of operating profitability on ROE.

- The fourth term on the right-hand side is again the total asset turnover ratio, an indicator of the overall efficiency of the company (i.e., how much revenue it generates per unit of total assets).
- The fifth term on the right-hand side is the financial leverage ratio described above—the total amount of a company's assets relative to its equity capital.
- This decomposition expresses a company's ROE as a function of its tax rate, interest burden, operating profitability, efficiency, and leverage. An analyst can use this framework to determine what factors are driving a company's ROE. The decomposition of ROE can also be useful in forecasting ROE based upon expected efficiency, profitability, financing activities, and tax rates. The relationship of the individual factors, such as ROA to the overall ROE, can also be expressed in the form of an ROE tree to study the contribution of each of the five factors

View Markdown Source

```
### Expressing ROE - five-way decomposition

$$
\begin{aligned}
\frac{\text{Net income}}{\text{Average Shareholders' Equity}}
&=
\frac{\text{Net Income}}{\text{EBT}}
\times
\frac{\text{EBT}}{\text{EBIT}}
\times
\frac{\text{EBIT}}{\text{Revenue}} \\
\times
\frac{\text{Revenue}}{\text{Average Total Assets}}
&\quad\times
\frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}}
\end{aligned}
\tag{3}
$$

which can be interpreted as follows:

ROE $=$ Tax burden $\times$ Interest burden $\times$ EBIT margin $\times$
Total asset turnover $\times$ Leverage
```

INDUSTRY-SPECIFIC FINANCIAL RATIOS

As stated in this module, a universally accepted definition and classification of ratios does not exist. The purpose of ratios is to serve as indicators of important aspects of a company's performance and value. Aspects of performance that are considered important in one industry may be irrelevant in another, and industry-specific ratios reflect these differences. For example, companies in the retail industry may report same-store sales changes because, in the retail industry, it is important to distinguish between growth that results from opening new stores and growth that results from generating more sales at existing stores. Industry-specific metrics can be especially important to the value of equity in early-stage industries, where companies are not yet profitable.
In addition, regulated industries-especially in the financial sector-often are required to comply with specific regulatory ratios. For example, the banking sector's liquidity and cash reserve ratios provide an indication of banking liquidity and reflect monetary and regulatory requirements. Banking capital adequacy requirements attempt to relate banks' solvency requirements directly to their specific levels of risk exposure.

Business Risk

$$\text{Coefficient of Variation of Operating Income} = \frac{\text{Standard Deviation of Operating Income}}{\text{Average Operating Income}}$$

$$\text{Coefficient of Variation of Net Income} = \frac{\text{Standard Deviation of Net Income}}{\text{Average Net Income}}$$

$$\text{Coefficient of Variation of Revenues} = \frac{\text{Standard Deviation of Revenue}}{\text{Average Revenue}}$$

View Markdown Source

```
$$
\substack{\text{Coefficient of Variation } \\\text{of Operating Income}} =
\frac{\text{Standard Deviation of Operating Income}}{
\text{Average Operating Income}}
$$

$$
\substack{\text{Coefficient of Variation} \\\text{of Net Income}} =
\frac{\text{Standard Deviation of Net Income}}{\text{Average Net Income}}
$$

$$
\substack{\text{Coefficient of Variation} \\\text{of Revenues}} =
\frac{\text{Standard Deviation of Revenue}}{\text{Average Revenue}}
$$
```

Financial Sector Ratios

$$\text{Capital Adequacy (Banks)} = \frac{\text{Various Components of Capital}}{\substack{\text{Various measures such as risk-weighted} \\ \text{assets, market risk exposure, or level of } \\ \text{operational risk assumed}}}$$

$$\substack{\text{Monetary Reserve Requirement} \\ \text{(Cash Reserve Ratio)}} = \frac{\text{Reserves Held at Central Bank}}{\text{Specified Deposit Liabilities}}$$

$$\substack{\text{Liquid Asset} \\ \text{Requirement}} = \frac{\text{Approved "readily marketable" Securities}}{\text{Specified Deposit Liabilities}}$$

$$\text{Net Interest Margin} = \frac{\text{Net Interest Income}}{\text{Total Interest-Earning Assets}}$$

View Markdown Source

```
### Financial Sector Ratios

$$
\text{Capital Adequacy (Banks)} =
\frac{\text{Various Components of Capital}}{
\substack{\text{Various measures such as risk-weighted} \\
\text{assets, market risk exposure, or level of } \\
\text{operational risk assumed}}}
```

```
$$

$$
\substack{\text{Monetary Reserve Requirement} \\
\text{(Cash Reserve Ratio)}} =
\frac{\text{Reserves Held at Central Bank}}{
\text{Specified Deposit Liabilities}}
$$

$$
\substack{\text{Liquid Asset} \\\text{Requirement}} =
\frac{\text{Approved "readily marketable" Securities}}{
\text{Specified Deposit Liabilities}}
$$

$$
\text{Net Interest Margin} =
\frac{\text{Net Interest Income}}{\text{Total Interest-Earning Assets}}
$$
```

Ratail Ratios

$$\substack{\text{Same (or comparable)} \\ \text{store sales}} = \substack{\text{Average Revenue Growth Year over Year} \\ \text{for Stores Open in Both Periods}}$$

$$\substack{\text{Sales per square meter} \\ \text{(or square foot)}} = \frac{\text{Revenue}}{\substack{\text{Total Retail Space in Square} \\ \text{Meters (or Square Feet)}}}$$

View Markdown Source

```
### Ratail Ratios

$$
\substack{\text{Same ( or comparable)} \\\text{store sales}} =
\substack{\text{Average Revenue Growth Year over Year} \\
\text{ for Stores Open in Both Periods}}
$$

$$
\substack{\text{Sales per square meter} \\\text{(or square foot)}} =
\frac{\text{Revenue}}{\substack{\text{Total Retail Space in Square} \\
\text{Meters (or Square Feet)}}}
$$
```

Service Companies

$$\text{Revenue per Employee} = \frac{\text{Revenue}}{\text{Total Number of Employees}}$$

$$\text{Net Income per Employee} = \frac{\text{Net Income}}{\text{Total Number of Employees}}$$

View Markdown Source

```
### Service Companies

$$
\text{Revenue per Employee} =
\frac{\text{Revenue}}{\text{Total Number of Employees}}
$$

$$
\text{Net Income per Employee} =
\frac{\text{Net Income}}{\text{Total Number of Employees}}
$$
```

Hotel

$$\text{Average Daily Rate} = \frac{\text{Room Revenue}}{\text{Number of Rooms Sold}}$$

$$\text{Occupancy Rate} = \frac{\text{Number of Rooms Sold}}{\text{Number of Rooms Available}}$$

View Markdown Source

```
### Hotel

$$
\text{Average Daily Rate} =
\frac{\text{Room Revenue}}{\text{Number of Rooms Sold}}
$$

$$
\text{Occupancy Rate} =
\frac{\text{Number of Rooms Sold}}{\text{Number of Rooms Available}}
$$
```

Subscription or Relationship-Based Businesses

$$\substack{\text{Average Revenue per} \\\text{User (ARPU)}} = \frac{\text{Revenue}}{\substack{\text{Average Number of} \\\text{Subscribers or Users}}}$$

View Markdown Source

```
### Subscription or Relationship-Based Businesses

$$
\substack{\text{Average Revenue per} \\\text{User (ARPU)}} =
\frac{\text{Revenue}}{
\substack{\text{Average Number of} \\\text{Subscribers or Users}}}
$$
```

Note: Many other industry-specific ratios are outside the scope of this module. Resources such as Standard and Poor's Industry Surveys present useful ratios for each industry. Industry organizations may present useful ratios for the industry or a task specific to the industry.
