

Ratio analysis is a control technique to evaluate performance in terms of ratios instead of absolute figures.¹ It is the analysis of the relationship between items of financial data, or between financial and non-financial data such as labour cost per employee. Ratios sometimes prove themselves more meaningful than the absolute figures. It is used by different user groups like managers, investors, creditors, auditors, banks, etc. The purpose is to make a comparative analysis over a series of time as well as with the industry benchmark for ratios mean very little when used in isolation. Attention, however, should be paid over natural correlation between the numerator and denominator of the ratios; for example, sales commission will obviously vary directly with sales, whereas most administrative costs will not. Moreover, ratios are indicators only and must be supplemented by a detailed analysis to discover the reality.

Financial ratios

Financial ratios are used to compare the risk and return of different firms in order to help equity investors and creditors make intelligent investment and credit decisions. Such decisions range from an evaluation of changes in performance over time for a particular investment to a comparison among all firms within a single industry at a specific time. The informational needs and appropriate analytical techniques used for these investment and credit decisions depend on the decision maker's time horizon. Accordingly, financial ratios are categorized in four broad heads of analysis:

- 1) **Activity analysis** – Evaluates revenue and output generated by the firm's assets.

¹ Adapted from G.I.White, A.C.Sondhi and D.Fried - The Analysis and Use of Financial Statements – 1998

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2) **Liquidity analysis** – Measures the adequacy of a firm's cash resources to meet its near-term obligations.

3) **Long term debt and solvency analysis** – Examines the firm's capital structure in terms of the mix of financing its financing sources and the ability of the firm to satisfy its long-term debt and investment obligations.

4) **Profitability analysis** – Measures the income of the firm relative to its revenue and invested capital.

A primary advantage of financial ratios is that they can be used to compare the risk and return relationships of firms of different sizes. Ratios can provide a profile of a firm, its economic characteristics and competitive strategies, and its unique operating, financial, and investment characteristics.

However, ratios are based on implicit assumptions of proportionality – the economic relationship between numerator and denominator does not depend on size - ignoring the existence of fixed costs. Ratio computations and comparisons are further confounded by the lack or inappropriate use of benchmarks, the timings of transactions, negative numbers, changing price level and differences in reporting methods.

### **Activity analysis**

A firm's operating activities require investments in both short-term (inventory and accounts receivable) and long-term (property, plant, and equipment) assets. Activity ratios describe the relationship between the firm's level of operations (usually defined as sales) and the assets needed to sustain operating activities. The higher the ratio, the more efficient the firm's operations, as relatively fewer assets are required to maintain a given level of operations (sales). Trends in these ratios over time

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and in comparison to other firms in the same industry can indicate potential trouble spots or opportunities. Furthermore, although these ratios do not measure profitability or liquidity directly, they are important factors affecting those performance indicators.

Activity ratios can also be used to forecast a firm's capital requirements (both operating and long-term). Increase in sales will require investment in additional assets. Activity ratios enable the analyst to forecast these requirements and to assess the firm's ability to acquire the assets needed to sustain the forecasted growth.

### 1) **Short-term (operating) activity ratios**

i) **Inventory turnover** = Cost of goods Sold / Average inventory

Inventory turnover ratio measures the efficiency of the firm's inventory management. A higher ratio indicates that inventory does not remain in warehouse or on the shelves but rather "turns over" rapidly from the time of acquisition to sale. This ratio is affected by the choice of accounting method. The inverse of this ratio can be used to calculate the average number of days inventory is held until it is sold - Average number of days inventory =  $365 / \text{inventory turnover}$ .

ii) **Receivables turnover** = Sales / Average Receivables

The receivable turnover ratio measures the effectiveness of the firm's credit policies as well as indicates the level of investment in receivables needed to maintain the firm's sales level. Receivable turnover should be computed using trade receivables in the numerator in order to evaluate operating performance. Receivable generated from financing (unless customer financing is provided as a normal component of sales activities) and

investment activities (e.g. receivables from the sale of an investment) should be excluded as they do not represent normal recurring operating transactions. Adjustments may also be necessary if the firm has sold receivable during the period. The inverse of receivable turnover indicates the average number of days in which a receivable is received - Average collection period =  $365 / \text{Receivable turnover}$ .

iii) **Payable turnover** =  $\text{Purchases} / \text{Average Payables}$

Similar to the receivable ratio, payable turnover ratio indicates the lag in payment of payables. The inverse of payable turnover indicates the number of days in which an outstanding is paid - Average payable period =  $365 / \text{Payable turnover}$ .

Although accounts payable are liabilities rather than assets, their trend is significant as they represent an important source of financing for operating activities. The time spread between when supplier must be paid and when payment is received from the customer is critical for wholesale and retail firms with their large inventory balances. The relationship among accounts payable, accounts receivable, and inventories forms the operating cycle of the business.

iv) **Working capital turnover** =  $\text{Sales} / \text{Average working capital}$

The working capital turnover ratio is a summary ratio that reflects the amount of working (operating) capital needed to maintain a given level of sales. Only operating items should be used to compute this measure. Short-term-debt, marketable securities, and excess cash should be excluded as they are not required for operating activities.

## 2) **Long-term (Investment) activity ratios**

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i) **Fixed Asset turnover** = Sales / Average Fixed Assets

The fixed assets turnover ratio measures the efficiency of the (long term) capital investment. The ratio reflects the level of sales generated by investments in productive capacity. The level and trend of this ratio, however, are affected by characteristics of its components. Sales growth is continuous, albeit at varying rates. Increases in capacity to meet that sales growth, however, are discrete, depending on the addition of new factories, warehouse, stores, and so forth. Compounding this issue is the fact that management often has discretion over the timing, form, and financial reporting of the acquisition of incremental capacity. The combination of these factors results in an erratic turnover ratio.

The life cycle of a company or product includes a number of stages: startup, growth, maturity (steady state), and decline. Startup companies' initial turnover over may be low, as their level of operations is below their productive capacity. As sales grow, however, turnover will improve continually until the limits of the firm's initial capacity are reached. Subsequent increases in capital investment decrease the turnover ratio until the firm's sales growth catches up to the increased capacity. This process continues until maturity when sales and capacity level off, only to reverse when the firm enters its decline stage.

Additional problems can result from the timing of a firm's asset purchases. Two firms with similar operating efficiencies, having the same productive capacity and the same level of sales, may show differing ratios depending on when their assets were acquired. The firm with older assets has the higher turnover ratio, as accumulated depreciation has reduced the carrying value of its assets. Over time, for any firm, the accumulation of depreciation

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expense improves the turnover ratio (faster for firms that use accelerated depreciation methods or short depreciable lives) without a corresponding improvement in actual efficiency. The use of gross (before depreciation) rather than net fixed assets alleviates this shortcoming. However, this is rarely done in practice.

An offsetting and complicating factor is that newer assets generally operate more efficiently due to improved technology. However, due to inflation newer assets may be more expensive and thus decrease the turnover. Using the current or replacement cost rather than historical cost to compute the turnover ratio is one solution to this problem. Finally, it should be noted that methods of acquisition (lease versus purchase) and subsequently financial reporting choices (capitalization versus operating lease reporting) also affect turnover ratios for otherwise similar firms.

ii) **Total asset turnover** = Sales / Average total assets

Total asset turnover is an overall activity measure relating sales to total assets. This relationship provides a measure of overall investment efficiency by aggregating the joint impact of both short- and long-term assets. This comprehensive measure is a key component of the disaggregation of return on assets i.e. Operating margin \* Total asset turnover.

### Liquidity analysis

Short-term lenders and creditors (such as suppliers) must assess the ability of a firm to meet its current obligations. That ability depends on the cash resources available as of the balance sheet date and the cash to be generated through the operating cycle of the firm. Three ratios compare levels of cash resources with current liabilities as the measure of cash obligation.

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1) **Current ratio** = Current assets / Current liabilities

The current ratio defines cash resources as all current assets.

2) **Quick ratio** = Current asset – inventory / Current liability

A more conservative measure of liquidity is the quick ratio which excludes inventory from cash resources, recognizing that the conversion of inventory to cash is less certain both in terms of timing and amount. The included assets are quick assets because they can be quickly converted to cash.

3) **Cash ratio** = Cash + Marketable securities / Current liability

Finally, the cash ratio is the most conservative of these measures of cash resources as only actual cash and securities easily convertible to cash are used to measure cash resources.

The use of either the current or quick ratio implicitly assumes that the current assets will be converted to cash. In reality, however, firms do not actually liquidate their current assets to pay their current liabilities. Minimum level of inventories and receivables are always needed to main operations. If all current assets are liquidated, the firm has effectively ceased operations. These ratios therefore measure the margin of safety provided by the cash resources relative to obligations rather than expected cash flows.

Liquidity analysis, moreover, is not independent of activity analysis. Poor receivable or inventory turnover ratio limits the usefulness of the current and quick ratios. Obsolete inventory or uncollectible receivable are unlikely to be sources of cash. Thus, level and changes in short-term liquidity ratios over time should be examined in conjunction with turnover ratios.

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An important limitation of liquidity ratios is the absence of an economic or real world interpretation of those measures. Unlike the cash cycle liquidity measure, which reflects the number of days cash is tied up in the firm's operating cycle, there is no intuitive meaning to a current ratio of 1.5. For some companies that ratio would be high, for others dangerously low.

The defensive interval, in contrast, does provide an intuitive feel for a firm's liquidity, albeit a most conservative ones. It compares the currently available quick resources of cash (Cash plus Marketable Securities plus Receivables equivalent to Current assets minus Inventory) with estimated outflows needed to operate the firm: projected expenditures.

Defensive interval = $365 * \text{Quick assets} / \text{Projected expenditure}$

The defensive interval represents a worst case scenario indicating the number of days a firm could maintain the current level of operations with its present cash resources but without considering any revenues.

Long term debt and solvency analysis

The analysis of a firm's capital structure is essential to evaluate its long-term risk and return prospects. Leveraged firms accrue excess returns to their shareholders as long as the rate of return on the investments financed by debt is greater than the cost of debt. The benefits of financial leverage bring additional risks, however, in the form of fixed cost that adversely affect profitability if demand or profit margin decline. Moreover, the priority of interest and debt claims can have a severe negative impact on a firm when adversity strikes. The inability to meet these obligations can lead to default and possible bankruptcy.


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1) **Debt ratio** - Long-term debt and solvency analysis evaluate the level of risk borne by a firm, changes over time, and risk relative to comparable investments. A higher proportion of debt relative to equity increases the riskiness of the firm. Debt ratio are expressed either as

i) **Debt to total capital** =  $\text{Debt} / \text{Debt} + \text{Equity}$ , or

ii) **Debt to equity** =  $\text{Debt} / \text{Equity}$

As with other ratios, industry and economy-wide factors affect both the level of debt and the nature of the debt (maturities and variable or fixed-rate). Capital intensive industries tend to incur high levels of debt to finance their property, plant and equipment. Such debt should be long-term to match the long time horizon of the assets acquired.

2) **Interest coverage ratio** - Debt-to-equity ratios examine the firm's capital structure and, indirectly, its ability to meet current debt obligations. A more direct measure of the firm's ability to meet interest payment is:

i) **Interest coverage** =  $\text{Earning before Interest and Tax} / \text{Interest expense}$

This ratio measures the protection available to creditors as the extent to which earnings available for interest cover interest expense.

## **Profitability analysis**

Equity investors are concerned with the firm's ability to generate, sustain and increase profits. Profitability can be measured in several differing but interrelated dimensions.

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1) **Return on sales** - One measure of profitability is the relationship between the firm's cost and its sales reflecting the residual return to the firm's per rupee of sales. The ability to control costs in relation to revenues enhances the earnings power. Different measures of profitability and sales are:

i) **Gross margin** = Gross profit / Sales

Gross Margin captures the relationship between sales and manufacturing / merchandising costs.

ii) **Operating margin** = Operating income / Sales

Operating margin provides information about a firm's profitability from the operation of its "core" business, excluding the effects of investing and financing activities as well as tax planning.

iii) **Profit margin** = Net income / Sales

Finally, the profit margin is net of all expenses.

2) **Return on investments** - Another measure of profitability, return on investment, is the relationship between profits and the investment required to generate them. Diverse measures of the investment results in different forms of return on investment (ROI).

i) **Return on Assets** = Earning before Interest and Tax / Average total assets

The return on assets (ROA) compares income with total assets (equivalently, total liability and equity capital). It can be interpreted in two ways. First, it measures management's ability and efficiency in using the firm's asset to generate (operating)

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profits. Second, it reports the total return accruing to all providers of capital (debt and equity), independent of the source of capital.

ii) **Return on Equity** = Net income / Average shareholders' equity

The return on total stockholders' equity (ROE) excludes debt in the denominator and uses either pre-tax income (after interest cost) or net income as the numerator.

### **EPS & P/E ratios**

**Earning per share** = Net income / Average no. of shares

**Price earning ratio** = Market price per share / Earning per share

Earning per share (EPS) is probably the most widely available and commonly used performance statistic for publicly traded firms. It is used to compare operating performance and for valuation purposes either directly or together with market prices in the familiar form of price/earnings (P/E) ratio. The EPS and P/E ratios are reported in the business section of many newspapers. Unlike other ratios discussed above, however, the calculation of EPS is governed and mandated by the financial reporting standards.

In India, EPS reporting requirements is governed by Accounting Standard 20, Earning Per Share.