

*Helping You to Develop  
Your Business with Free  
Hints and Tips...*

*... In This Issue*

*Accounting and  
Economic Models &  
Techniques*

# *Accounting and Economic Models and Techniques*

⇒ *Managing and improving financial performance*

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## *Overview*

**Entrepreneurial flair is as much a state of mind and attitude as it is a set of skills. Nonetheless, certain skills will ensure that decisions are entrepreneurial and focused on commercial success.**

This article focuses on six models and techniques:

- Break-even analysis
- Discounted cash flow
- Economies of scale
- Elasticity
- Financial ratios
- Variance analysis

## *Break-even analysis (cost-volume-profit or CVP analysis)*

### **Overview**

Break-even analysis is a marginal costing technique that highlights how total costs, revenues and profits relate to sales volume.

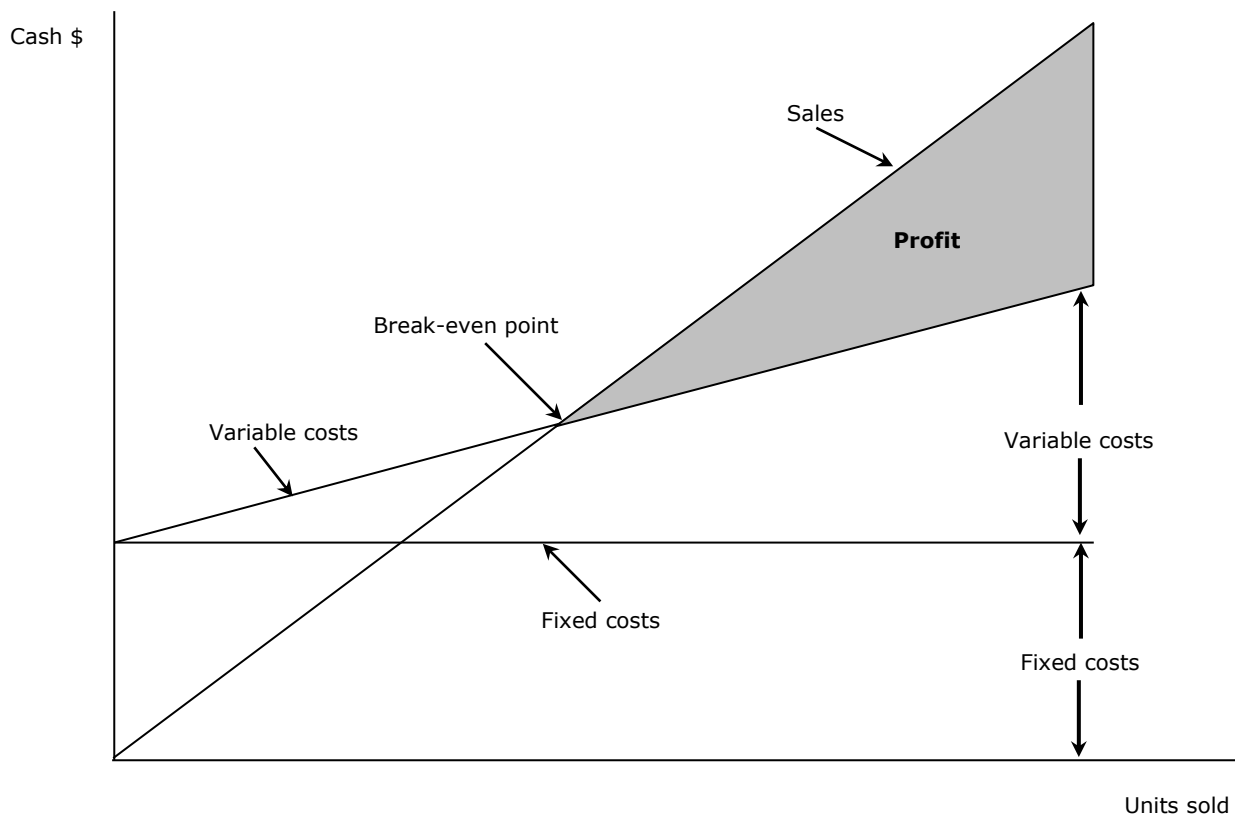
The break-even point is when sales cover costs – where neither a profit nor a loss results. It is calculated by dividing the costs of the project by the gross profit at specific dates, making an allowance for overhead costs. Break-even analysis is used to decide whether to continue development of a product and whether to change suppliers to reduce costs. It also helps with managing the sales mix, cost structure and production capacity, as well as forecasting and budgeting.

*Knowing when a project or new business will break-even is important in any decision to invest.*

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### In practice

1. Because total fixed costs are constant, for one additional unit of production, costs will only rise by the marginal (variable) cost of production and sales for that unit.
2. Break-even analysis is reliable when the sales price per unit is constant, when stock levels do not vary significantly, when the sales mix is constant and when the model is applied within the business's normal range of output levels.
3. The key elements of break-even analysis are:
  - **Sales revenue** – the financial income from the sale of the units.
  - **Total costs**, comprising all variable (marginal) costs plus fixed costs.
  - **The break-even point** that occurs where revenues and total costs are equal so there is neither profit nor loss. It is expressed as the number of units sold or the amount of sales revenue.



4. Break-even analysis is used for:
  - **Forecasting** how total costs, revenues and profits relate to total sales volume. Break-even analysis can then be used to forecast the effect on profit of changes in costs, price and volume.
  - **Budget planning** by calculating the volume of sales required to break-even and deciding the safety margin for profits in the budget.
  - **Business decisions** relating to sales mix, cost structure and production capacity.

# *Discounted cash-flow*

## **Overview**

Discounted cash flow (DCF) is based on one key principle: that the value of money changes, effectively reducing with time. In other words, cash today is worth more than cash promised in the future. As an example, it is not worth investing \$100,000 today for the promise of the same amount returned next year; more usefully, DCF can show that it may not even be worth investing \$100,000 today for the promise of \$110,000 in three years' time. There are three reasons for this. First, the organisation investing the \$100,000 is bearing a market risk, and risk demands return. The greater the risk, the greater the compensation required. Second, the investor is bearing an opportunity cost – they cannot invest the same money in another venture – and this cost also requires a return. Third, and perhaps most significantly, the value of the investor's money is being reduced by inflation, and this also demands a return. If annual inflation is running at 2.5%, then an organisation investing \$100,000 will need a yield after tax of \$2,500 a year just to compensate for inflation. This is central to the concept of the time value of money.

## **In practice**

There are five steps in DCF analysis:

1. Develop, as accurately as possible, a projection of the future operations in which the money is going to be used – taking sales, costs and other relevant financial aspects into account. Typically, the projection should be broken down for each year of the period of the investment.
2. Quantify positive and negative cash flows for each year of the projection (and find out the annual net total cash inflow or outflow).
3. Estimate the value of the cash flow for the final year of the projection. A conservative and prudent approach that is widely adopted is to assume that the final year's cash flow will continue in perpetuity.
4. Decide the discount factor – the percentage amount that will be applied to each year's cash flow. Determining this factor is central to the whole exercise. A higher discount factor will generate a lower overall valuation. Typically, two factors influence the level of the discount factor; the first is the level of business risk. If the risk is high (and the investment is unlikely to meet its projections), then the discount factor should also be high. Second, the factor is often a compromise between the cost of borrowed money (such as 5% interest) and the return expected by the investors (for example, 15%); in this case, the discount factor would be 10%. It may be desirable to select a range of discount factors – providing optimistic, realistic and worst case scenarios.
5. Apply the discount factor to the net cash flow for each year of the projection and for the terminal value. The figures resulting from these calculations are the present value contribution of each year's future cash flow; adding these values provides a total estimate for the value of the investment.

Discounted cash flow analysis is used to help value the potential of an organisation and to make other investment decisions. The discounted cash flow method assesses the projected stream of economic benefits (such as cash flow, net sale proceeds, value

of intangible assets) and calculates the maximum investment that should be made. This is known as *net present value* analysis. It also enables comparison of an investment amount with other economic benefits and provides an overall rate of return. This is *internal rate of return analysis* and it enables the rate of return provided by a particular investment to be assessed. Discounted cash flow analysis is often more useful than other valuation methods, such as price-earnings ratios. Discounted cash flow will highlight a sound investment case.

## Economies of scale

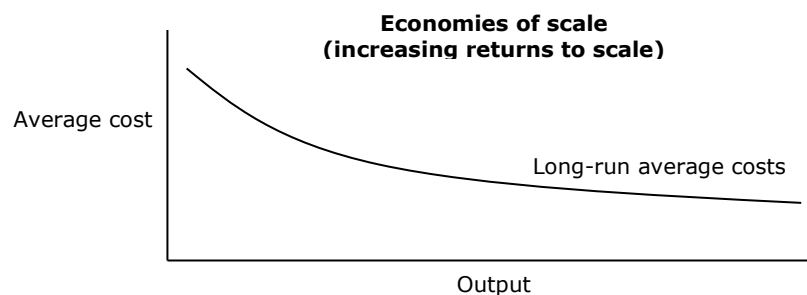
### Overview

Economies of scale are increasing returns that are achieved when average costs (cost divided by output) decrease as output (the volume of production) rises. A thorough understanding of economies of scale can be applied to ensure:

- Targeted improvements in efficiency, leading to greater profitability and shareholder value.
- Targeting optimum output levels.
- Effective control of costs.
- Greater utilisation of resources.
- Appraisal of management effectiveness.

*Diseconomies of scale or decreasing returns occur when long-run average costs increase as output rises.*

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### In practice

The key to successfully achieving economies of scale is to ensure that long-run average costs decline, so that average costs of production fall as output increases. This occurs as a result of:

- Fixed features of the production process, such as fixed costs.
- Specialisation, where outputs increase through expertise and efficiency.
- Efficient and better plant and equipment (often within larger organisations).

# Elasticity

## Overview

Elasticity measures the sensitivity of the demand or supply of goods to percentage changes in the price of those goods (price elasticity) or to changes in the income available to purchase those goods (income elasticity).

Elasticity can be used:

- To support price setting (supply price or purchase price) and, consequently, costing.
- To aid market entry and product launch decisions.
- To predict likely responses of suppliers or customers to changes in price that the organisation is willing to pay, or intends to charge, customers.
- To calculate optimal levels of goods to supply to customers to yield the best return.

*Price elasticity assumes that quantities of goods demanded and supplied vary with changes in the price of those goods, as well as changes in prices of other related goods and available income.*

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Supply and demand affects pricing; generally, when supply is high relative to demand, prices will fall. The converse is also true: when demand is high relative to supply, prices will rise – one sales technique is to stimulate demand by creating a perception of scarcity. Price elasticity of demand highlights how the volume of demand is influenced by changes in price. When demand is elastic, a change in price (whether a rise or fall) causes a relatively greater change in the quantity demanded. Conversely, when demand is price inelastic, a change in price (again, whether a rise or fall) leads to a relatively smaller change in the quantity demanded.

## In practice

Elasticity of demand can be calculated as:

$$\text{Percentage change in volume of demand} \div \text{Percentage change in price}$$

The negative or positive sign in the answer only tells you about the relationship between demand and price; it does not tell you about the level of elasticity. If demand and price move in opposite directions, the answer will be negative. If demand and price move in the same direction, the answer will be positive.

When price elasticity of demand is negative, as with the majority of tradable goods and services, then a rise in price leads to a fall in demand, as fewer are willing or able to purchase a given quantity at the higher price.

If price elasticity of demand is positive this means that a rise in the price will lead to a rise in demand, meaning that it is a 'snob' good – people may prefer diamonds they perceive as 'expensive' rather than cheaper ones. In this instance, a rise in earnings can happen when the price rises – but this lucky situation is quite rare!

The value of the number reveals the level of elasticity.

*When the answer is greater than one*

If the % change in demand is greater than the change in price, then demand is elastic. By using the equation, when the answer is greater than one, demand is elastic, as price changes lead to relatively larger changes in demand. Here, price changes will have a considerable impact on the volume of sales.

*When the answer is less than one*

If the % change in demand is less than the % change in price, then demand is inelastic. If your answer to the equation is less than one, price changes lead to relatively smaller changes in demand. In this case, price changes will have a relatively smaller impact on the volume of sales than for elastic goods. Clearly, the potential loss of revenue from a price reduction needs to be carefully assessed before a decision can be made.

## ***Financial ratios***

### **Overview**

Ratios not only enable managers to analyse specific business situations and make effective decisions but they also help in monitoring the performance of a business and its competitors. It informs management decisions and can often help to avoid inappropriate or even damaging decisions. Ratios have four main uses:

- To analyse situations.
- To monitor and measure performance.
- To assess performance of subsidiary companies.
- To facilitate planning, investment and market entry decisions.

*Ratios are often used to support systematic analysis of suppliers, customers and competitors, as well as more general market and industry trends.*

### **In practice**

The most significant ratios affecting managers relate to the business's markets, providers of capital, suppliers and employees. Also important are ratios that show how well the firm is using its assets and how well it is providing for the future. When using ratios ask the following questions:

- Which ratios are most appropriate for each part of the business? Masses of irrelevant ratios waste time and cause confusion. Knowing which ratios apply to different areas, improves the efficiency and focus of analysis.
- How reliable is the data on which the ratio is based?
- What does the ratio mean? Is it absolute (for example, the number of days credit taken by debtors) or relative (such as the level of gross profit)? What lies behind the ratio – what are the causes behind the trend? It is important to understand the causes: a ratio is only the symptom.
- What comparisons are desirable in using a ratio? Ratios are most effective when compared over time or between competitors. Plotting ratios in charts illuminates trends, as well as clearly communicating the data.

Ratios are used across a wide spectrum of business activities, from marketing or managing people to production. For managers, the most significant ratios relate to markets, assets, providers of capital, suppliers and employees. An awareness of which ratios other people monitor allows for the broader organisational picture to be kept in sight – this can include current and potential investors and other stakeholders. Communicating with those people affected by decisions, how each ratio works and what it means, keeps strategy focused and people committed.

Ratios relating to markets and products include:

**Sales growth** is measured by dividing sales for the period by sales for a previous period. The period that is chosen can be highly significant: the shorter it is (a day or week) then the more sensitive the ratio becomes. Shorter periods are more relevant for reflecting seasonal demand.

**Value of work in hand** highlights the size of a firm's order book. It is calculated by dividing the value of orders in hand by the average value of daily sales. Analysis of this ratio over an extended period highlights trends in sales performance – large fluctuations may indicate instability or vulnerability.

**Marketing efficiency (sales to cost ratio)** is calculated as a percentage of revenue and it is marketing spend divided by revenue. When budgeting, for example, it is useful to know how much money needs to be devoted to marketing to generate a given level of sales.

In highly competitive situations, sales growth should be read alongside the **market share ratio**. This is calculated by dividing current market share by previous market share. If market share is being taken together with sales growth then the periods need to be similar. Ratios of the market share of each product, or the product as a percentage of turnover, can be compared between periods to see which markets and product groups are most profitable. This highlights strengths and weaknesses in a product portfolio and can be used to gauge a product's position in its life-cycle. If it is declining it is important to decide if it is a long-term and irreversible trend or a short-term blip, in which case corrective action could improve the situation.

Liquidity and other commercial ratios include:

**Gross profit and net profit ratios.** These two important ratios reveal much about the profitability of a business. They indicate the profitability of sales once direct costs of sale are deducted (gross profit), whilst the net profit ratio highlights the overall effect of all costs in relation to gross profit. The gross profit ratio is calculated as gross profit (revenue less direct costs of sales i.e. excluding overhead costs) divided by revenue. Each industry has its own standards and norms for gross profit and, as with any ratio, it is important to monitor and control fluctuations in gross profit over time. Net profit ratio is calculated as net profit (revenue less total costs) divided by revenue. Both of these ratios should increase over time, as the business becomes more established.

**Creditor and debtor days.** Creditor days measures the number of days on average that a company requires to pay its creditors, while debtor days is the reverse, the number of days on average that it takes for a company to receive payments (this is also known as accounts receivable days). Creditor days provide an indication of the time a firm is willing to wait for payment, and potentially offers insight into the creditworthiness of a firm that is in debt and not paying its bills within a reasonable



(i.e. agreed) period. Debtor days matters because it provides an indication of a firm's efficiency in collecting monies owed.

- Creditor days are calculated by dividing the cumulative amount of unpaid suppliers' bills by sales, then multiplying by 365.
- Debtor days are calculated by dividing the cumulative amount of accounts receivable by sales, then multiplying by 365.

**Quick (or acid-test) ratio** shows how quickly a company's assets can be turned into cash. This assessment of a company's liquidity is therefore known as the quick ratio or simply the acid ratio. The most common expression of the quick ratio (although there are several ways of deriving the same result) is to subtract inventory from current assets and then divide this by current liabilities. In general, the ratio should be 1:1 or better, reflecting a healthy proportion of current assets to current liabilities.

**Stock turnover** indicates how long cash is being tied up in stock. It is calculated as the stock value divided by the average daily cost of sales. The quicker that stock is turning over, the more efficiently cash is being used.

**Profit vulnerability** (the vulnerability of profits to increasing costs) can be monitored by dividing fixed expenditure (for example, fixed overhead costs such as premises or salaries) by total expenditure. This identifies where costs are changing and which costs are causing fluctuations in profitability over time.

**The price/earnings ratio** is simply the share price divided by the earnings per share (EPS). This ratio is the one that investors and analysts focus on and it forms part of the valuation of a company during acquisitions and disposals. The higher the ratio, the more the company is deemed to be worth, although there are several points to note. P/E ratios vary across industry sectors and in different countries, and are relative to those of competitors. They rise when the share price rises for example, when there is speculation about a merger or take-over. Also, they can lag behind events, combining current share price with past earnings. A P/E ratio may, for instance, be too high compared to likely future growth.

**Return on equity** tests how much money a business makes for its investors, who therefore pay considerable attention to it. It is calculated as net profit after tax divided by equity capital.

**Suppliers' prices and performance** can be monitored using ratios. Fluctuations in suppliers' prices are measured by dividing a supplier's current prices by their prices at a previous date. The time that suppliers take to deliver is calculated by dividing the value of outstanding orders with suppliers by the value of average daily purchases. Supplier's reliability can be assessed by dividing the value of overdue orders from the supplier by the average daily purchases from all suppliers.

**Employee productivity** can be measured in a number of ways. Profit per employee is calculated by dividing profit by the number of employees. A more interesting ratio of value-added per employee is calculated by dividing sales less material costs by the average number of employees. Employment costs can be measured and monitored for a range of criteria. For example, training costs can be related to profit for budgeting purposes and is calculated as training expenditure divided by profit.

# Variance analysis

## Overview

However diligently a budget is prepared, things will not turn out as planned. There will be a variance between what was anticipated and what happened. Understanding the differences between actual and planned performance is known as *variance analysis*. It is used to monitor and manage the results of past decisions, assess the current situation and to highlight solutions.

## In practice

The process starts by breaking down substantial variances into their component parts, identifying exactly where and why the variance occurred. Although it is best to focus on the most significant difference first, seemingly small issues can have significant effects. For example, small variances in unit costs or unit prices can have significant effects on volumes, affecting the bottom line. Key performance indicators (KPIs) can be monitored that will regularly track and identify variances.

Common causes of variances include inefficiency, poor or flawed planning (for example, relying on historically inaccurate information), poor communication, interdependence between departments and random factors.

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