

Break-Even Point

Student Document

So, you want to make money? Learning the basics before beginning is a smart move, because making money is more than just having a great idea. It's equally important to know where the money comes from and where it all goes. Throughout the lesson we will define some important terms, starting with profit.

Profit is the amount of revenue you get to keep after all expenses are paid. Revenue is the amount of money made from a business. Expenses are the costs incurred to make the revenue, and profit is the remaining money after expenses are paid.

Revenue is the money a business makes. If a business sells a product, revenue is the price a product is sold for multiplied by the number of products sold. If a business provides a service instead of selling a product, then the revenue would be the price charged for a service (commonly referred to as a fee) multiplied by the number of services. If the service is provided to each customer only once in a specific period of time, then revenue is the fee charged, multiplied by the number of customers.

Expenses are costs incurred to make the revenue. There are two types of expenses: fixed costs and variable costs. Fixed costs do not change regardless of how many products sold or services performed. Examples of fixed costs include rent, insurance premiums, and loan payments. Labor costs can be a fixed cost if workers are paid a salary or paid by the hour since their cost is determined by time and not by how many products they produce. Fixed costs are usually the same amount each month. Variable costs change depending on how many products are made or how many services are performed. Examples of variable costs include raw materials used to manufacture the product, consumption of fuel during production of the product and packaging of the finished product. If workers are paid by the number of pieces they produce, then labor costs would be a variable cost, as well. Variable costs are zero if production is zero. Variable costs will grow as more products are produced. Fixed costs and variable costs add up to expenses.

If revenue is the money earned, and expenses are paid from the revenue, then profit is the remaining revenue left after expenses: $\text{Profit} = \text{Revenue} - \text{Expenses}$.

Use algebra to reposition the variables: $\text{Revenue} = \text{Expenses} + \text{Profit}$.

This is the same formula, just written in a different way. Notice the left side of the equal sign shows how much money is earned and the right side shows where it all goes.

Break-Even Point (BEP)

In general, the BEP or break-even point is where gains equal losses. In business, the BEP is the point where revenue equals expenses. At this point, there is no profit. For a business, knowing and reaching the BEP is the first major step toward creating a profitable company. The break-even point is when earnings equal what it costs to earn it, which means there is no profit and no loss. You break-even.

If revenue = expenses + profit, and profit is 0 at the BEP then revenue = expenses at the BEP.

Revenue is the price charged for a product (P) multiplied by the number of products sold (x) so revenue = Px.

Expenses are fixed costs + variable costs. Fixed costs are a constant number (FC) and variable costs are costs to make each product (V) multiplied by the number of products sold (x) so expenses = FC + Vx.

Substituting these values for the big-picture variables in our BEP equation:

Revenue = Expenses at the BEP

Px = Vx + FC at the BEP

Example:

A product costs \$15.00 and seven are sold this week. My fixed costs for the week are \$94.50 and my variable costs are \$1.50 each to produce the product.

P = \$15.00

X = 7 units

FC = \$94.50

V = \$1.50

Px = Vx + FC

(\$15.00) x (7 units) = (\$1.50) x (7 units) + \$94.50

\$105.00 = \$10.50 + \$94.50

\$105.00 = \$105.00

Revenue = Expenses

I broke even this week by selling seven units at \$15.00 each.

Had I sold 11 units instead of seven units this week, my revenue would have exceeded my expenses and I would have made a profit. How much is the profit?

Contribution Margin

An important term used in BEP analysis is contribution margin. This is the amount of revenue available to pay the fixed costs for a business.

Contribution Margin = Revenue – Variable Costs

Subtracting the per-unit costs (variable costs) from the revenue earned leaves the contribution margin. If the contribution margin is less than the fixed costs, the BEP has not been reached. When the contribution margin equals fixed costs, you are at the BEP. If the contribution margin exceeds fixed costs, there is a profit.

Example:

A product costs \$15.00 and 25 are sold this week. My variable costs are \$1.50 each to produce my product. Can you calculate the contribution margin? Is there a profit? Explain your answer.

Break-Even Sales Units

Using BEP analysis, we can ask and answer some very important questions about the business such as, how many units must be sold to break-even?

The answer to this question is called break-even sales units and can be calculated.

In the BEP equation: $Px = Vx + FC$

X is the number of units sold that brings the equation into balance. Use algebra to solve for X:

$$\begin{aligned} Px &= Vx + FC \\ (Px - Vx) &= FC \\ x(P - V) &= FC \end{aligned}$$

$$x = \frac{FC}{(P - V)}$$

Solving for X shows the amount of units that need to be sold to break-even.

Calculate the break-even sales units for the following situation:

I'm selling product for \$15.00 per unit with a variable cost per unit of \$7.00. My fixed costs are \$9,000.

Solution:

$$x = \frac{FC}{(P - V)} \quad \text{where: } P = \$15.00, V = \$7.00 \text{ and } FC = \$9,000$$

$$x = \frac{9000}{(15 - 7)} = \frac{9000}{8} = 1,125 \text{ units}$$

Break-Even Sales Dollars

Another important question can be answered using BEP analysis: How much revenue must I make to break-even?

The answer to this question is called break-even sales dollars and can be calculated.

In the BEP equation: $Px = Vx + FC$

Px is the revenue needed to bring the equation into balance, P is the price of each product, X is the number of units necessary to reach the BEP.

Break-even sales dollars = price per unit multiplied by break-even sales units.

Use an algebra substitution:

$$\text{Break-even sales dollars} = P \times \frac{FC}{(P - V)}$$

The answer shows the amount of revenue needed to break-even.

Calculate the break-even sales dollars for the following:

I'm selling a product for \$15.00 per unit with a variable cost per unit of \$7.00. My fixed costs are \$9,000.

First, calculate the break-even sales units (x):

$$x = \frac{FC}{(P - V)} \quad \text{where: } P = \$15.00, V = \$7.00, \text{ and } FC = \$9,000$$

$$x = \frac{9000}{(15 - 7)} = \frac{9000}{8} = 1,125 \text{ units}$$

Multiply break-even sales units by price per unit to find the break-even sales dollars.

Break-even sales dollars = \$15.00 x 1,125 units = \$16,875 revenue.

Now try a few on your own using the Break-Even Point Assessment document.