Breakeven Worksheet

To conduct a simple, back of the envelope breakeven analysis, you first need to understand two basic economic concepts – fixed costs and variable costs.

- **fixed costs**: costs that remain constant regardless of the amount of product produced and sold
- **variable costs**: costs that change depending on the amount of product produced and sold

Examples of fixed costs include: employee salaries, rent, computers, insurance and furniture.

Examples of variable costs include: costs of the components used in making a unit of the product, packaging and shipping.

As you will see, it's important for entrepreneurs to keep their fixed costs as low as possible when they're starting out because it reduces the number of units they'll need to produce and sell to breakeven (and then begin making a profit).

A third basic economic concept is the notion of a unit margin. The easiest way to understand a unit margin is to think of it as the amount of money you have left after selling a product and paying for whatever it costs you to make just that one unit of the product. For example, if I sell you a glass of lemonade for $2 that cost me $0.75 to make (variable costs include lemons, sugar and a glass), then the amount I'd have left after paying back my unit variable costs is $1.25 ($2 - $0.75 = $1.25). This amount is my unit margin for the glass of lemonade.

Stated formally,

- **unit margin** = per unit revenue – variable cost per unit

Typically, "per unit revenue" is the selling price and "variable cost per unit" is the total of all incremental expenses that were incurred to produce and sell the unit.

When stated in %, a unit margin is typically referred to as a profit margin

- **profit margin** = (per unit revenue – variable cost per unit)/per unit revenue

Let's work thru a simple example to make sure that we understand how to calculate unit margin and profit margin.

Cost per unit: $25

Selling price per unit: $40

What is the **unit margin**?

What is the **profit margin**?

(Answers on the next page)

Answers:

Unit margin = per unit revenue – variable cost per unit = $40 -$25 = **$15**

Profit margin = (per unit revenue – variable cost per unit)/per unit revenue = ($40-$25)/$40 = 0.375 or **37.5%**

Now that we understand fixed costs, variable costs and unit margins we're ready to take on the calculation of **breakeven quantity**. This calculation is extremely useful as a reality check because it tells us how much we will need to sell just to cover any fixed costs we might have incurred when setting up a business. If we sell less than the breakeven, we'll lose money. If we sell more, then we will be able to turn a net profit.

Here's how we do the calculation:

- **breakeven quantity** = total fixed costs/unit margin

So, let's say that you want to start a t-shirt business and you're thinking about hiring a graphic designer for $1,000 to design some awesome shirts (you'll own the designs) and buying a used silk screen press for $2,500. You also need to incorporate, get a business license and buy some general supplies, which may cost another $1,500. Importantly, all of these costs will need to be paid regardless of whether you sell one t-shirt or 10,000+; thus, these costs are fixed costs, and they total $5,000 ($1,000 + $2,500 + $1,500 = $5,000).

Now let's consider variable costs. In this case, you have the cost of each shirt that you'll be printing ($5/shirt), some ink/dye ($0.25/shirt), packaging for shipping the shirt to a customer ($0.50/shirt) and the cost of labor ($1.25/shirt). NOTE: we're assuming that you're paying someone per shirt that they make for you; if you're paying them a salary, then the salary would be a fixed cost, not a variable cost.

When you add up these variable costs they total $7 per shirt ($5 + $0.25 + $0.50 + $1.25 = $7).

Now we need just one more number to figure out the breakeven quantity – the selling price or revenue per unit. Remember, breakeven quantity equals total fixed costs divided by unit margin. And unit margin is equal to per unit revenue minus variable cost per unit. Thus,

- breakeven quantity = total fixed costs/(per unit revenue – variable cost per unit)

So, what is our breakeven quantity if we sell each shirt for $10?

- breakeven quantity = $5,000/($10-$7) = $5,000/$3 = 1667 t-shirts (rounded to nearest shirt)

And what would it be if we sell each shirt for $11?

- breakeven quantity = $5,000/($11-$7) = $5,000/$4 = 1250 t-shirts (rounded to nearest shirt)

This example illustrates one last key point – namely, small increases in pricing efficiency can make a big impact on profitability. In this case, being able to charge 10% more ($11 instead of $10) would lower the number of shirts we need to sell to breakeven by 417, which is a reduction of more than 25% (417/1667)!

Practice questions.

1. If a pair of Vans skate shoes sells for $50 and it costs $30 to produce, what is the unit margin for the skate shoes? What is the margin in percentage terms?

2. The newly launched Vans record label pays its staff $2MM in annual salaries and benefits. The label also pays each band/artist a $25,000 lump sum for completing an album plus $1.50 for each album download that they sell. The downloads cost $0.10 each in server costs and they sell to consumers for an average price of $9. Assuming Vans receives albums from 5 bands/artists in their first year, how much will they incur in fixed costs? What is their unit margin for each album download? How many album downloads will Vans need to sell to break even? (Hint: you will need to determine which costs are fixed and which are variable before completing your breakeven calculations).

Answers:

1. Unit margin = $20; profit margin = 40%
2. Fixed costs = $2.125MM; unit margin = $7.40; breakeven volume = 287,162 downloads