

Revenue: Total, Marginal and Average

by Sophia



WHAT'S COVERED

This tutorial will cover the different revenues: total, marginal, and average. We will also discuss the price effect and output effect, and how they differ in competitive or imperfectly competitive firms.

Our discussion breaks down as follows:

1. Total Revenue
2. Marginal Revenue
 - a. Perfect Competition
 - b. Imperfect Competition
3. Output Effect
4. Price Effect
5. Total Revenue Maximized
6. Output and Price Effect in Perfect Competition
7. Average Revenue

1. Total Revenue

As a reminder, the point of owning a business is to make a profit, and profit equals revenues minus costs.

Profit = Revenues - Costs

In this tutorial, we will focus on the revenue piece of this equation.

Total revenue is the amount received from sales of the good or service produced.



HINT

Often, you will hear the term "revenue" interchanged with the term "sales," because they refer to the same thing.

Total revenue is simply the price that you are charging for your product times the quantity you are selling.



FORMULA TO KNOW

Total Revenue

$$TR = P (\text{price}) \times Q (\text{quantity})$$

In perfect competition, there is no control over price. Firms are pricetakers; there is only one price that they can charge for their good.

⇒ **EXAMPLE** For example, in perfect competition, if we sell 0 t-shirts, our total revenue is nothing. If we sell 1 t-shirt, using the formula of price times quantity, now our total revenue is \$15. If we sell 2, it's \$30, and so on. Notice that revenue will go up by \$15 each time because there is only one price that can be charged.

Quantity of T-Shirts	Total Revenue
0	\$0
1	\$15
2	\$30
3	\$45
4	\$60



TERM TO KNOW

Total Revenue

The amount received from sales of the good or service produced

2. Marginal Revenue

Marginal revenue is the additional revenue resulting from the increase of product sales by one unit.

[[hint]] Remember, the term "marginal" means additional, so you are focusing on incremental revenue gained by increasing sales by one unit.]]

2a. Perfect Competition

In perfect competition, marginal revenue equals the change in total revenue divided by the change in quantity.



FORMULA TO KNOW

Marginal Revenue

$$MR = \frac{\Delta TR}{\Delta Q} = \frac{\text{Change in Total Revenue}}{\text{Change in Quantity}}$$

Referring back to our perfect competition example, marginal revenue is simply the change from one unit to the next--it goes up by \$15 each time.

Notice that marginal revenue is actually quite easy if you are looking at a perfect competitor because every time you sell one more, you simply take in an additional price of the product here--in this case, \$15.



BIG IDEA

Marginal revenue and price are the same thing for a perfect competitor.

Quantity of T-Shirts	Total Revenue	Marginal Revenue
0	\$0	--
1	\$15	\$15
2	\$30	\$15
3	\$45	\$15
4	\$60	\$15

2b. Imperfect Competition

However, in imperfect markets, in order to sell more, the firm must lower price; they *do* have control over price.

An imperfect competitor must determine how much they want to sell.

If they are selling nothing, they know it is because their price is too high. Therefore, they can lower price and sell one more. If they want to sell more, they lower price again.

Quantity	Price	Total Revenue	Marginal Revenue
0	\$11	\$0	--
1	\$10	\$10	\$10
2	\$9	\$18	\$8
3	\$8	\$24	\$6
4	\$7	\$28	\$4
5	\$6	\$30	\$2
6	\$5	\$30	\$0
7	\$4	\$28	-\$2

This means that total revenue will not be increasing by the same amount every single time, which also means marginal revenue will not be equal to the price.

As you can see, as the quantity sold goes up, marginal revenue goes down. It can actually be negative. Clearly, a business would never want to do this because that would mean that they are taking in negative dollars, or losing money.



TERM TO KNOW

Marginal Revenue

The additional revenue resulting from the increase of product sales by one unit

3. Output Effect

Now, the additional revenue that a business gains from selling more is known as the **output effect**, defined as the revenue received from selling additional units of a good or service.

Back to our example, notice that by lowering price from \$10 to \$9, this firm sold one more unit.

The output effect in this case, then, is the \$9 they gained from selling this additional unit.



TERM TO KNOW

Output Effect

The revenue received from selling additional units of a good/service

4. Price Effect

Now, to sell more, the firm lowers the price to gain additional customers. However, they have to lower price for *everyone*--even the customers who were willing to pay more.

By lowering the price, the firm is losing out on the ability to charge them the higher price. This foregone revenue from the original customers is known as the **price effect**.

In our example, they lost out on the ability to charge the first customer \$10. The price effect is the \$1 they lost out on charging the first customer.

Instead of \$10, they are only able to charge that first customer \$9. This is why their marginal revenue is only \$8.

They gained \$9 from selling to Customer 2, but they lost \$1 from not being able to charge this person the higher price of \$10. The difference between those two effects is the marginal revenue of \$8.

$$\Delta TR = (\text{output effect}) - (\text{price effect})$$

$$\Delta TR = \$9 - \$1 = \$8$$

Marginal revenue will not be equal to the price, as it was in perfect competition. The change in total revenue or marginal revenue will be the output effect minus the price effect.

The price effect refers to the fact that in order to sell additional units, competitive firms must lower their price. The price effect represents the loss in revenue resulting from this price drop.



TERM TO KNOW

Price Effect

In order to sell additional units, competitive firms must lower their price. The price effect represents the loss in revenue resulting from this price drop.

5. Total Revenue Maximized

Now, notice that total revenue will be the highest where marginal revenue equals zero.

Quantity	Price	Total Revenue	Marginal Revenue
0	\$11	\$0	--
1	\$10	\$10	\$10
2	\$9	\$18	\$8
3	\$8	\$24	\$6
4	\$7	\$28	\$4
5	\$6	\$30	\$2
6	\$5	\$30	\$0
7	\$4	\$28	-\$2



Why is this? Well, it has to do with the word "marginal."

If the firm gains even one additional dollar--marginal revenue--from selling the next unit, total revenue will increase.

Now, this doesn't mean that this is the point where they are necessarily going to produce, because we haven't factored in the cost side of things. In reality, it may not be where they maximize their profits.

However, it is worth noting that they will be maximizing their total revenue when marginal revenue hits zero.

Put another way, if change in total revenue is the output effect minus the price effect, and the output effect is greater than the price effect, then total revenue will increase.

Vice versa, if the output effect is less than the price effect, then total revenue will decrease.



BIG IDEA

If output effect > price effect, total revenue increases.

If output effect < price effect, total revenue decreases.

6. Output and Price Effect in Perfect Competition

Now, because perfectly competitive firms can only charge one price, there is no price effect.

There is no lowering the price and losing out on other customers. They can sell all they want, in theory, at that price; there is no incentive for them to lower it, and they certainly can't raise price.

This means that marginal revenue will always equal price in a perfectly competitive industry.

7. Average Revenue

The last revenue to consider is **average revenue**, which is total revenue divided by the quantity sold.



FORMULA TO KNOW

Average Revenue

$$AR = \frac{TR}{Q} = \frac{\text{Total Revenue}}{\text{Quantity}}$$

Notice that if a firm is charging all customers the same price, then average revenue will be the same as price.

Quantity	Price	Total Revenue	Marginal Revenue	Average Revenue
0	\$11	\$0	--	--
1	\$10	\$10	\$10	\$10
2	\$9	\$18	\$8	\$9
3	\$8	\$24	\$6	\$8
4	\$7	\$28	\$4	\$7
5	\$6	\$30	\$2	\$6
6	\$5	\$30	\$0	\$5
7	\$4	\$28	-\$2	\$4



BIG IDEA

When all customers are charged the same price, average revenue is equal to the price.



TERM TO KNOW

Average Revenue

Total revenue divided by the quantity sold



SUMMARY

Today we learned about all the different ways that we can look at revenue: **total revenue**, **marginal revenue**, and **average revenue**. We learned about the **output effect** and **price effect** and how it is different in **perfect competition** versus **imperfectly competitive firms**. Remember, **total revenue is maximized** where marginal revenue equals zero.

Source: Adapted from Sophia instructor Kate Eskra.



TERMS TO KNOW

Average Revenue

Total revenue divided by the quantity sold.

Marginal Revenue

The additional revenue resulting from the increase of product sales by one unit.

Output Effect

The revenue received from selling additional units of a good/service.

Price Effect

In order to sell additional units, competitive firms must lower their price. The price effect represents the loss in revenue resulting from this price drop.

Total Revenue

The amount received from sales of the good or service produced.



FORMULAS TO KNOW

Average Revenue

$$AR = \frac{TR}{Q} = \frac{\text{Total Revenue}}{\text{Quantity}}$$

Marginal Revenue

$$MR = \frac{\Delta TR}{\Delta Q} = \frac{\text{Change in Total Revenue}}{\text{Change in Quantity}}$$

Total Revenue

$$TR = P (\text{price}) \times Q (\text{quantity})$$