# Monopoly and Perfect Competition

## Perfect Competition

Perfect competition is a market model in which there are numerous buyers and sellers, so no individual participant has influence over the product price. In this scenario, companies are price takers and produce at the level where the price equals the marginal cost.

## Monopoly

A monopoly is a type of market in which there is only one seller. In a monopoly, the company has market power and can influence the product price. In a monopoly, the company maximizes its profits by choosing the production quantity where marginal revenue equals marginal cost. However, due to its market power, the monopolistic company generates a higher price than in the case of perfect competition.

## Practical example

Suppose the following inverse demand function: $P = 10 - 2Q$. The following total cost function: $C = 5Q^2$ And the marginal cost function: $MCG = 10Q$.

### Monopoly solution

If there is only one firm in the market, we equate marginal revenue to marginal cost. We get the marginal revenue from the demand function since the marginal revenue is equal to the demand function only that the slope is double:

$$10 - 4Q = 10Q$$

$$10 = 14Q$$

$$\frac{5}{7} = Q^m$$

Now to get the price we replace the quantity found in the demand function:

$$P^m = 10 - 2(\frac{5}{7}) = 60/7$$

### Graph: Monopoly

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To calculate the price, we first equate marginal cost to marginal income, and once the quantity is obtained, it is replaced in the demand function, and from there the transaction price is obtained.
To calculate consumer surplus, we calculate the area of a triangle:

$$Consumersurplus := \frac{(10 - 60/7) * 5/7}{2} = 0.5102$$

Now the calculation of the producer surplus is a sum of a rectangle and a triangle.

$$ProducerSurplus := \overset{Rectangle}{(60/7 - 7.143) * 5/7} + \overset{Triangle}{\frac{7.143 * 5/7}{2}} = 3.571$$

## Perfect competition

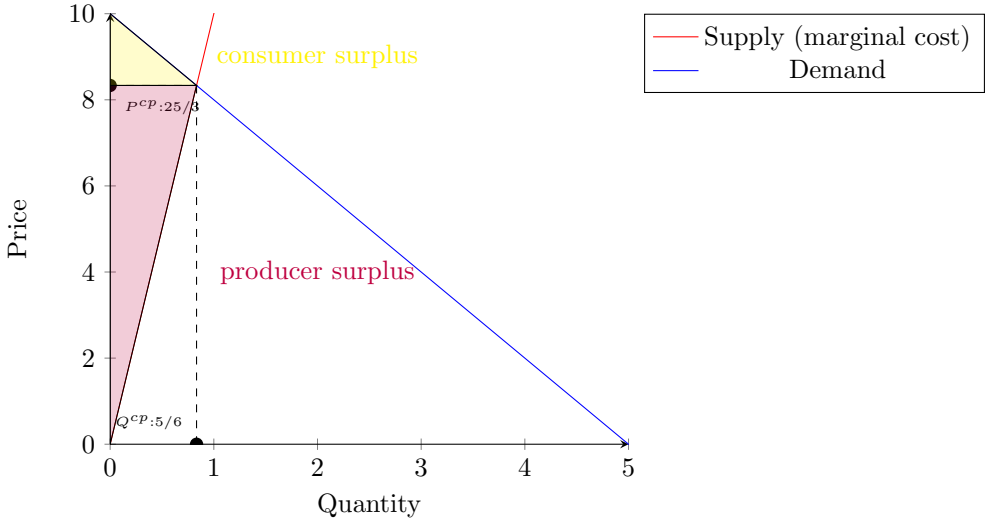
If the company from the previous section behaved as in perfect competition, it would equal $MCG = P$ that is:

$$10 - 2Q = 10Q$$
$$\frac{10}{12} = Q$$
$$\frac{5}{6} = Q^{cp}$$

And the price would be:

$$P^{cp} = 10 - 2\frac{5}{6} = 25/3$$

## Graph: Perfect Competition

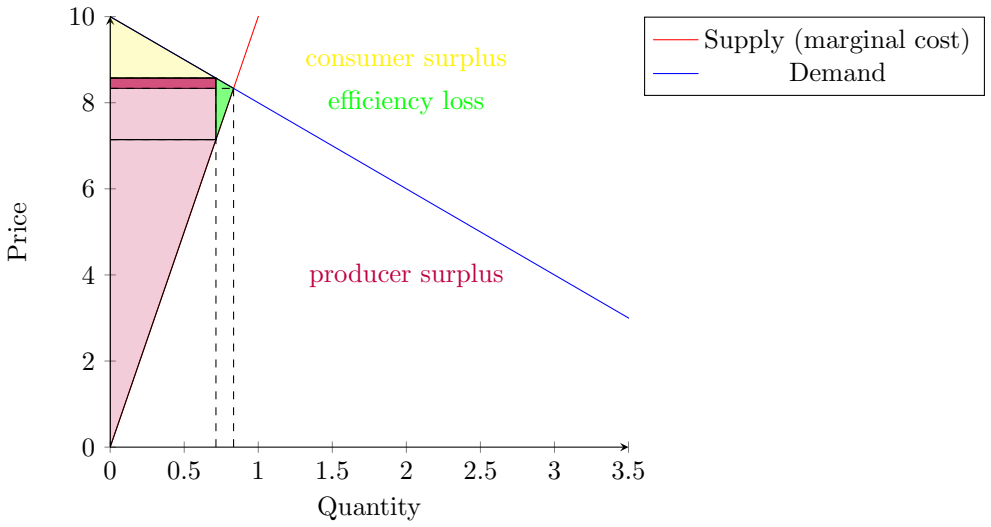



Calculating the surpluses, we have to calculate a triangle for each one:

$$\text{Consumer Surplus: } = \frac{(10 - 25/3) * 5/6}{2} = 0.694$$

$$\text{Producer Surplus: } = \frac{(25/3) * 5/6}{2} = 3.472$$

### Efficiency Loss and Transfer




In this last graph we can calculate the efficiency loss defined by the following triangle:

$$\text{Efficiency loss: } = \frac{(P^m - 7.143)(Q^{cp} - Q^m)}{2} = \frac{(60/7 - 7.143)(5/6 - 5/7)}{2} = 0.0850255$$

In addition, the same graph shows us that there is a part that was previously part of the consumer surplus that is now part of the producer surplus. This part is marked with a darker purple rectangle:

$$\text{Transfer of consumer surplus to producer: } = Q^m * (P^m - P^{cp}) = 5/7 * (60/7 - 25/3) = 0.17$$

## Conclusion

In a competitive market, efficiency is achieved when the price is equal to the marginal cost, which is the cost of producing an additional unit of the good or service. This condition ensures that resources are used as efficiently as possible: no additional unit is produced unless the benefit that consumers derive from that unit (measured by the price they are willing to pay) is at least as large as the cost of producing that unit.

However, in a monopoly, this condition is not met. The monopolist maximizes its profits by producing the quantity at which the marginal revenue, which is the additional revenue obtained from the sale of an additional unit of the good, equals the marginal cost. **Since the monopolist has total control over the quantity of goods produced in the market, it can reduce the quantity to raise the price. As a result, the price in a monopoly is higher than the marginal cost**.

This difference between the price and the marginal cost in a monopoly creates an efficiency loss, known as welfare loss, deadweight loss of efficiency or sunk cost. There are consumers willing to pay more than the marginal cost for additional units of the good, but those units are not produced in a monopoly. **In other words, there are mutually beneficial transactions (between the monopolist and consumers) that do not occur, and this is an efficiency loss**.

| | **Perfect Competition** | **Monopoly** |
|---|---|---|
| **Number of Producers** | Many producers | Single producer |
| **Price** | Determined by market supply and demand (firms act as price takers) | The firm has market power to set the price |
| **Quantity Produced** | $P = mc$, quantities larger than monopoly | $mr = mc$ Quantities less than in perfect competition |
| **Producer Surplus** | Lower than in monopoly | Generally higher than in perfect competition due to higher prices |
| **Consumer Surplus** | Generally high due to lower prices | Generally low due to higher prices |
| **Barriers to Entry** | No barriers to entry or exit | Entry barriers such that there is only one producer |
| **Profits** | Normal profits in the long run (due to free entry of firms) | Possibility of obtaining extraordinary profits (greater than 0) in the long run |
| **Efficiency** | Efficient | Inefficient, deadweight loss exists |

Table 1: Comparison between Monopoly and Perfect Competition