Chapter 5

Product Markets

Flow of study in this chapter

› Market structure

How economists categorize market according to competition and what are the interpretations of doing so.

› Perfect competition

Most repeated concept of ideal market, we structure how sellers in this market maximize it firm's profit, equilibrium in both short-run and long-run, including supply in the short-run.

› Monopoly

On the opposite side of competition, we also study situation when there is only a single seller in a market and how that affects revenue structure and the consumers' surplus.

› Monopolistic competition and oligopoly

Discuss the fundamental characteristics of these market structure, without going through much details about them.

Further reading can be found in Pindyck and Rubinfeld (2018) Part 2, Chapter 8-9 and Part 3, Chapter 10-12.

Introduction

This part will be the continuation from production and cost. We study firm's behavior to maximize profit further by looking at revenue in different types of market structure and how firms face with various scenarios. Cost part will also be heavily applied in this chapter as well.

Market is a context where transactions of goods and services occur, which can be categorized with various criteria such as

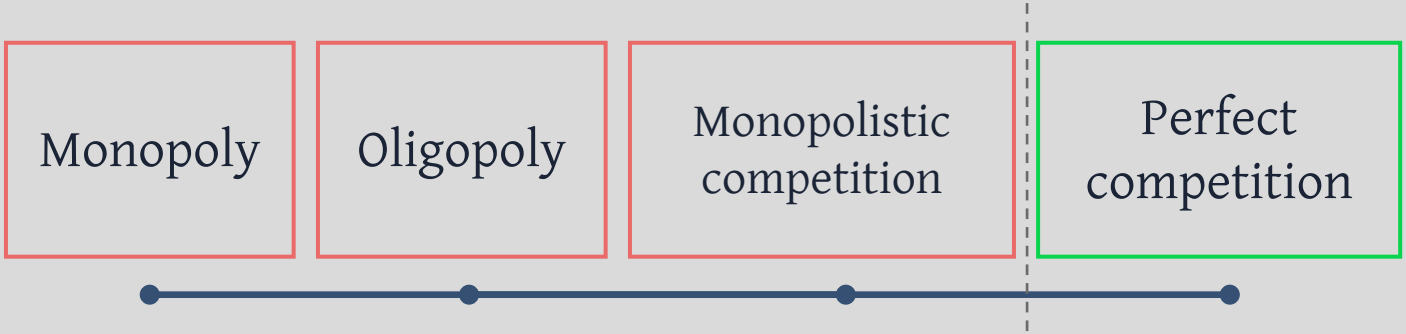
› **Time of transaction**: there are 'spot' and 'future' markets. In 'spot' market, once the transaction takes place, the delivery takes place, while in case of future markets, transactions are finalized pending delivery for future dates.

› **Types of product**: such as rice market, computer market, camera market, newspaper market.

› **Consumer**: premium markets consist of consumers who possess high purchasing power while other markets consist of consumers who have lower purchasing power.

Introduction

However, revenue and profit of a producer is determined by market structure, in other words, competition or number of sellers. Since we are now studying producer's condition to maximize profit, this part will focus on the specific market structure **based on number of producers.**



(1) Characteristics

For perfect competition, there are several characteristics and assumptions as follows

› Infinite number of buyers and sellers. All of them are small and have no control over market power. (Price taker)

› Homogenous products.

› Free-entry and exit.

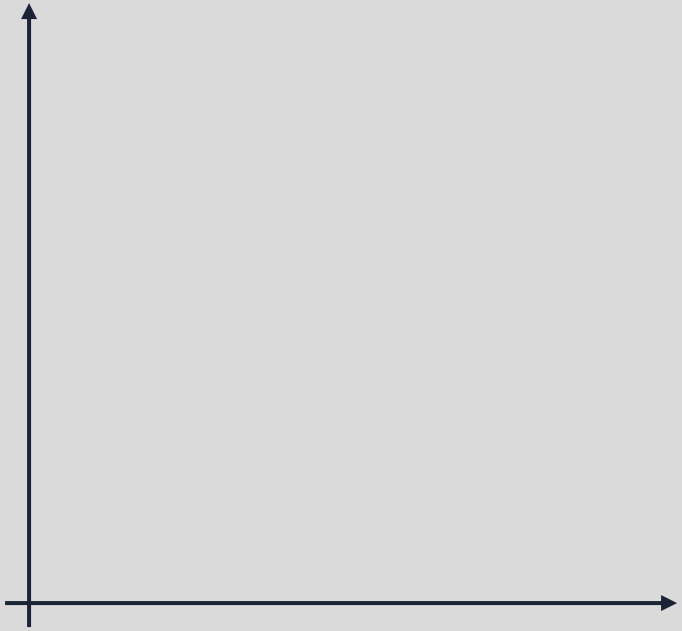
› Free flow of factors of production.

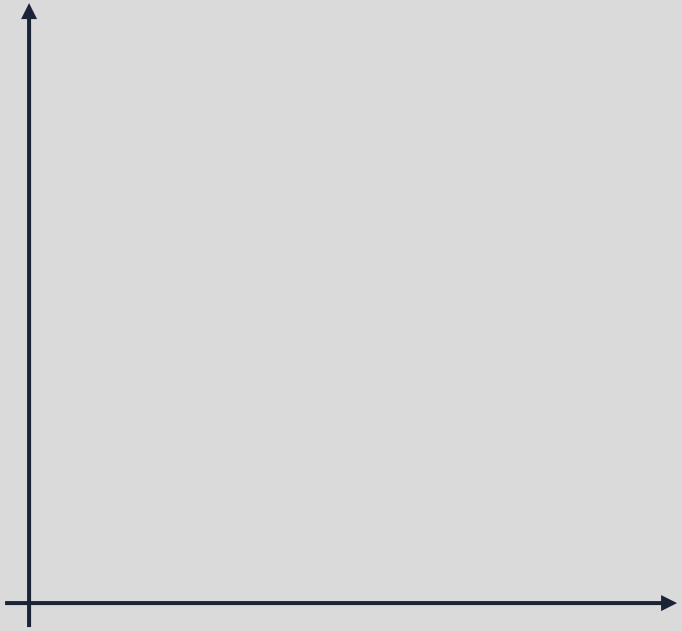
› Perfect information.

Example: can you list any product competing similarly to perfect competition

(1) Characteristics

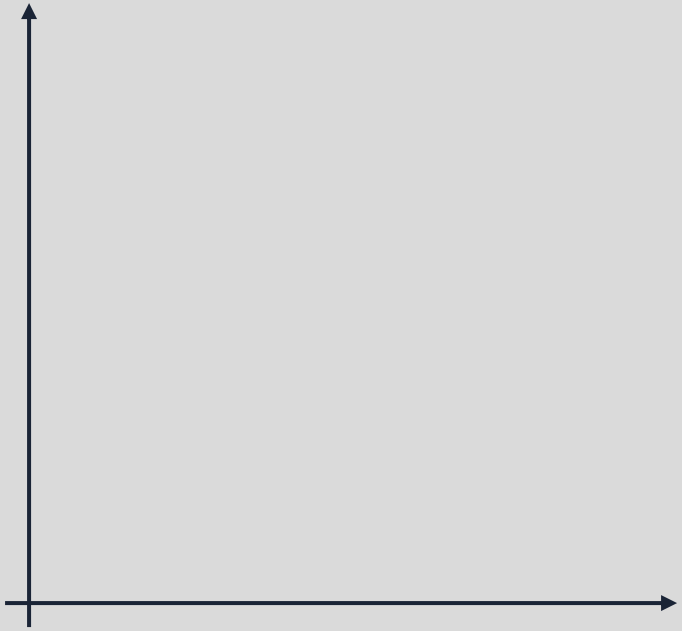
According to the ‘Price taker’ assumption, all sellers in this market accept price as a signal from the market.

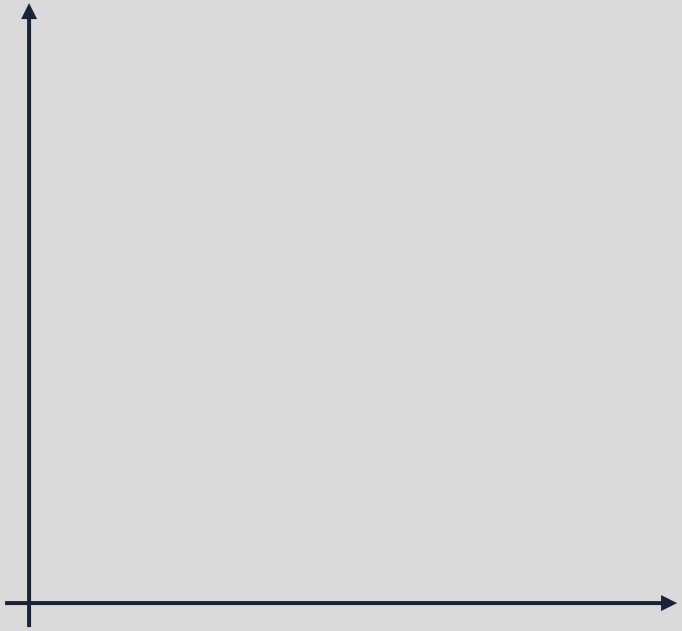




(1) Characteristics

Price can be changed due to the market force without an individual intervention as an example below.





(2) Revenue

Definition 5.1

Total revenue *is total income from selling all units of goods or services, denoted by* ***TR****.*

› $TR = P \cdot q$

Average revenue *is firm's revenue per good or service, denoted by* ***AR****.*

› $AR = \frac{TR}{q}$

Marginal revenue *is additional revenue from selling more 1 unit of goods or service, denoted by* ***MR****.*

› $MR = TR_n - TR_{n-1} = \frac{\Delta TR}{\Delta q} = \frac{dTR}{dq}$

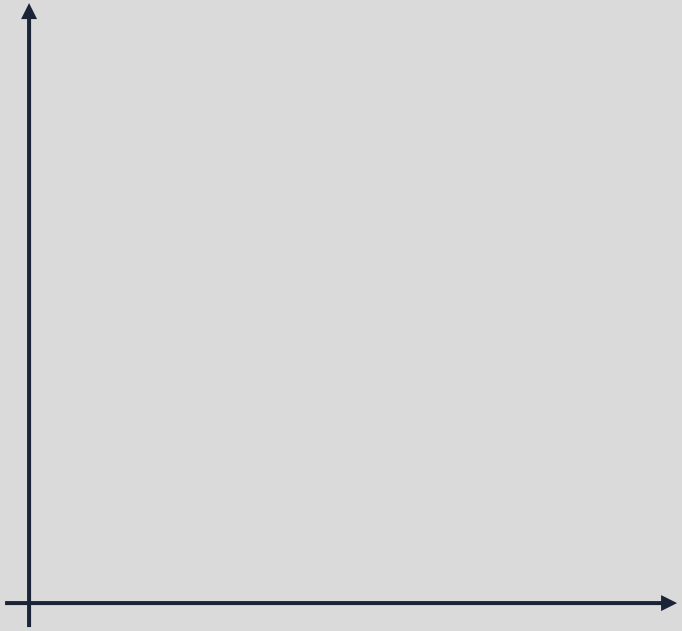
In order to understand the relationship between each type of revenue and product, the following table should help clarify.

(2) Revenue

Output (q)	Price	Total revenue (TR)	Average revenue (AR)	Marginal revenue (MR)
1	12			
2				
3				
4				
5				
6				

Now let's graph this table and see what to be notice.

(2) Revenue



Since we now have costs in the short-run and revenue, we can further define profit and find a condition that will maximizes it.

(3) Profit

Definition 5.2

Profit (loss) *is the difference between revenue and cost, denoted by* $\boldsymbol{\pi}$.

› $\pi = TR - TC$

In economics, we define profit a bit different from accounting.

› A firm has Excess profit when total revenue is more than total cost.
($TR > TC$ or $\pi > 0$)

› A firm has Normal profit when total revenue is equal to total cost.
($TR = TC$ or $\pi = 0$)

› A firm has loss when total revenue is less than total cost.
($TR < TC$ or $\pi < 0$)

Why do we define profit against our intuition?

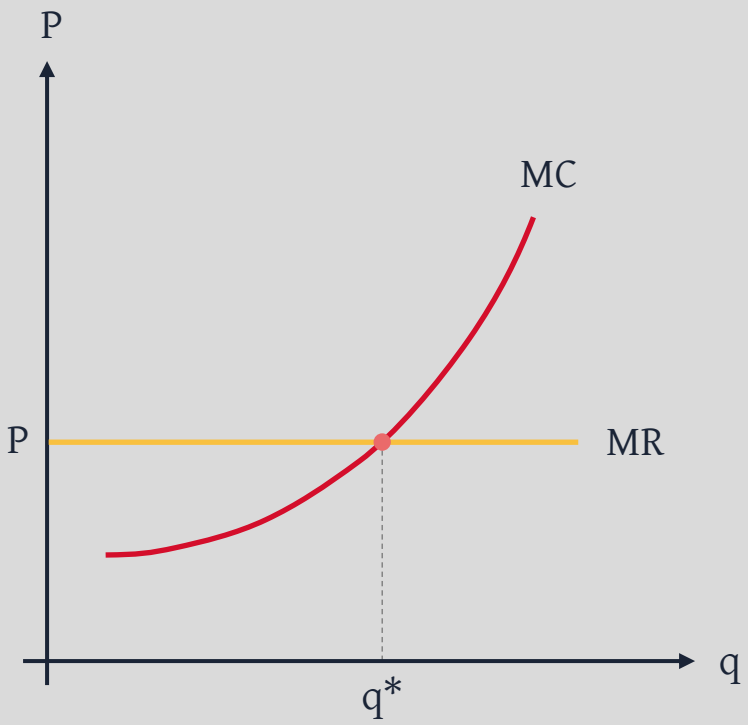
(3) Profit

Since we assumed that a firm's goal is to maximizing profit, we can prove from a simple statement here.

› $\max_{q} \quad \pi = TR - TC$

Why we consider marginal term instead of total term? Consider the following graph.

(3) Profit



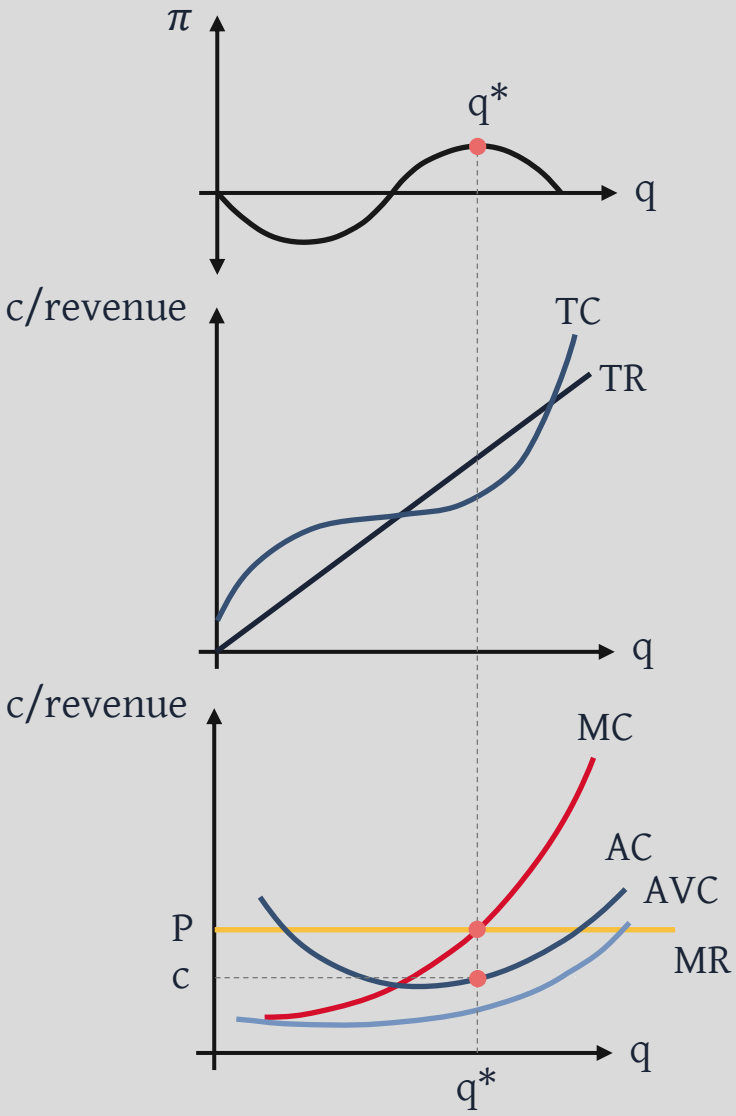
Consider when

› $MR > MC$

› $MR < MC$

Now we are going to look at all four scenarios and firm's decision in the short-run.

(4) Four scenarios: Excess profit



The top graph is (total) profit (loss) chart as a result from the middle graph.

The middle one is total cost and revenue plotted. The difference between these two is profit (loss).

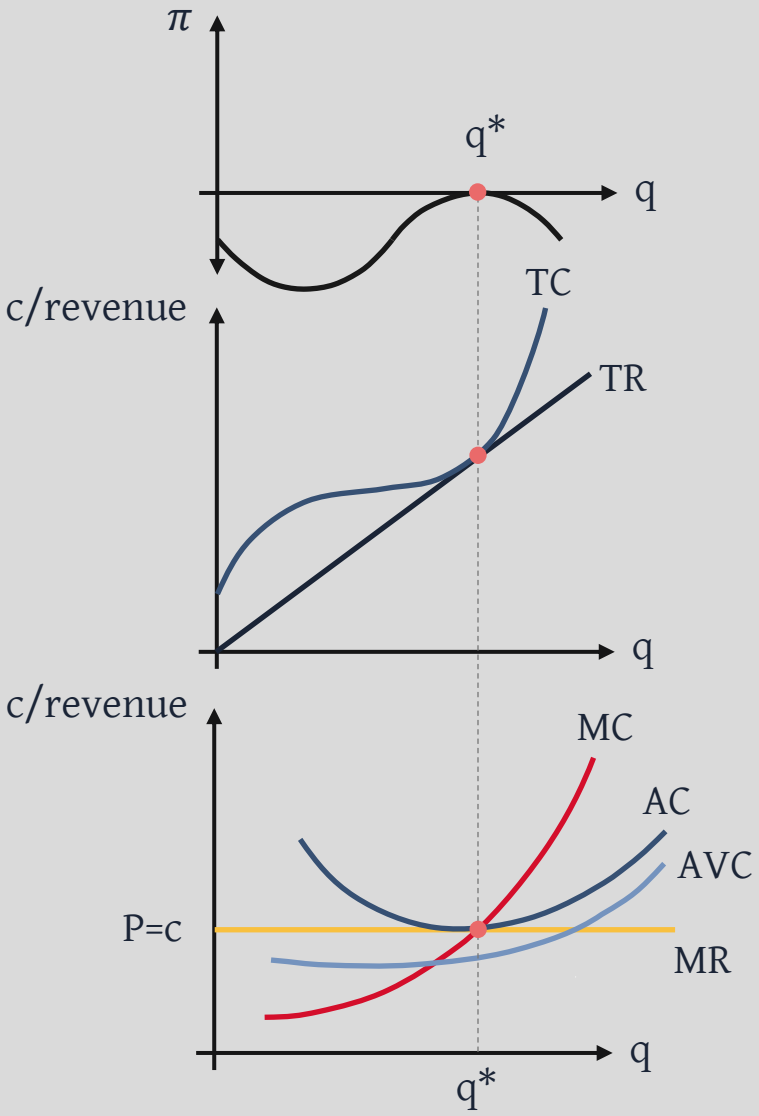
The bottom one is cost and price per unit q. From this graph, we can calculate the area of

› Total revenue:

› Total cost:

› Profit:

(4) Four scenarios: Normal profit



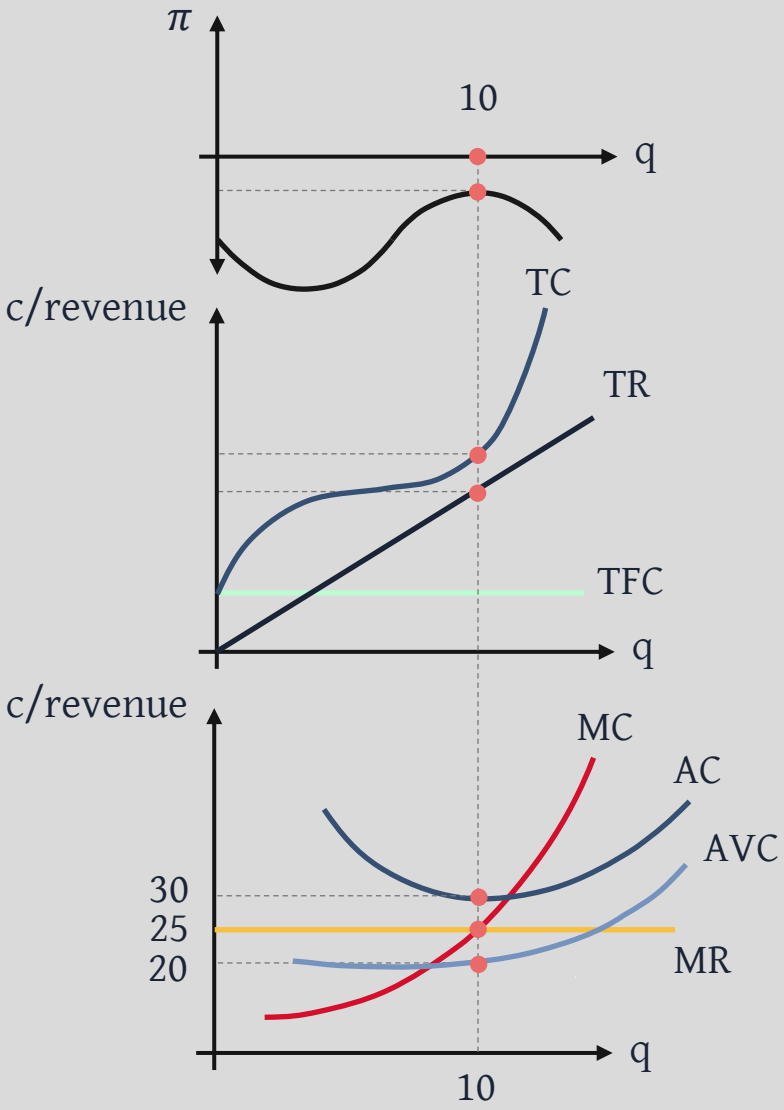
We turn our attention to the bottom graph, while maintaining the others as references.

› Total revenue:

› Total cost:

› Profit:

(4) Four scenarios: Least loss



The third scenario is quite tricky, so we are going to use numerical example here. Assume that at

› $q^* = 10$

› P = 25 / AC = 30 / AVC = 20

How much are

› TR =

› TC =

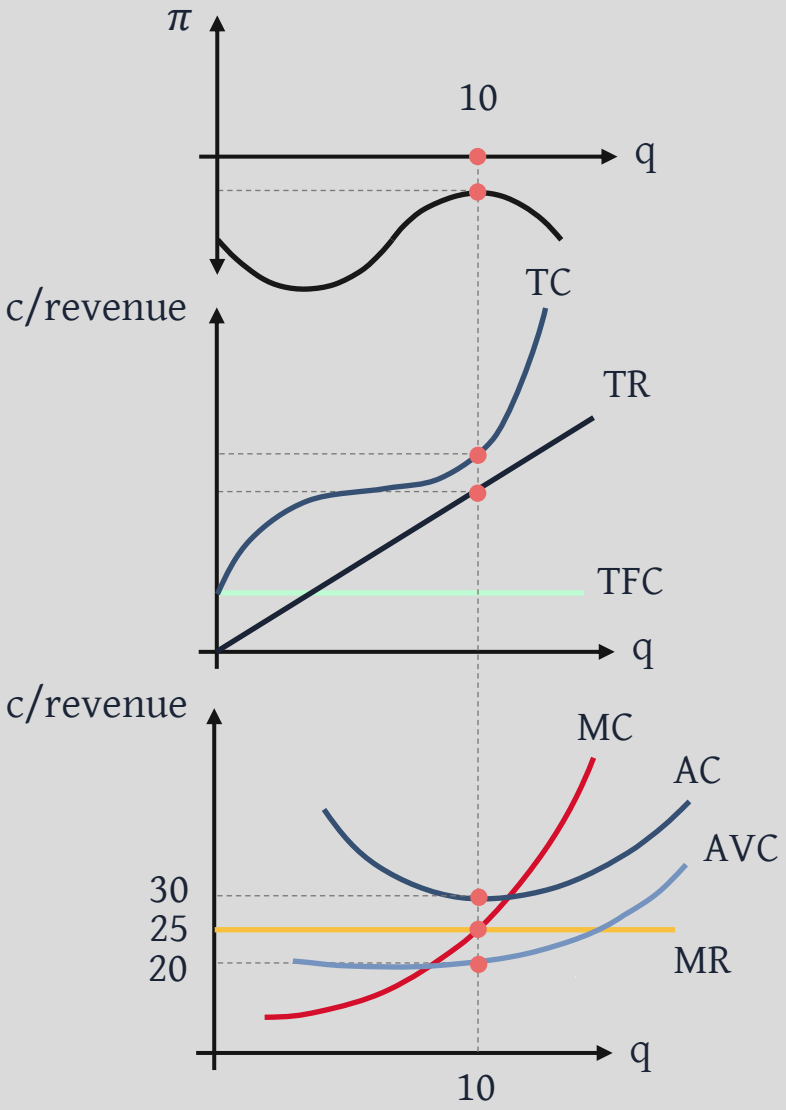
› π =

Now since TFC becomes relevant,

› TFC =

› TVC =

(4) Four scenarios: Least loss



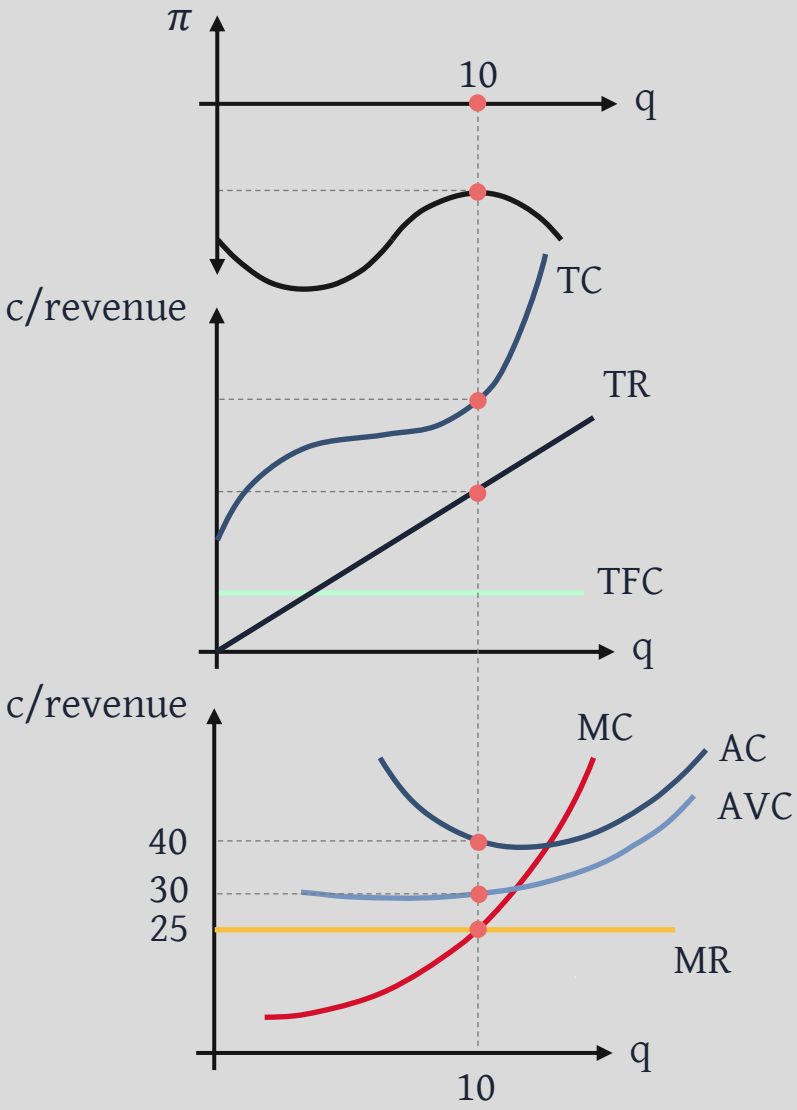
In the short-run, firm cannot adjust the amount of fixed factor at all, which means that even though there is no production, it must pay for the fixed cost. We compare loss from two cases as follows.

› Zero-unit production

› Producing and selling at q*

We can also prove that when P > AVC, a part of revenue can be used for the fixed cost.

(4) Four scenarios: Shut down



Again, we follow the same logic with least loss case. Assume that

› $q^* = 10$

› P = 25 / AC = 40 / AVC = 30

How much are

› TR =

› TC =

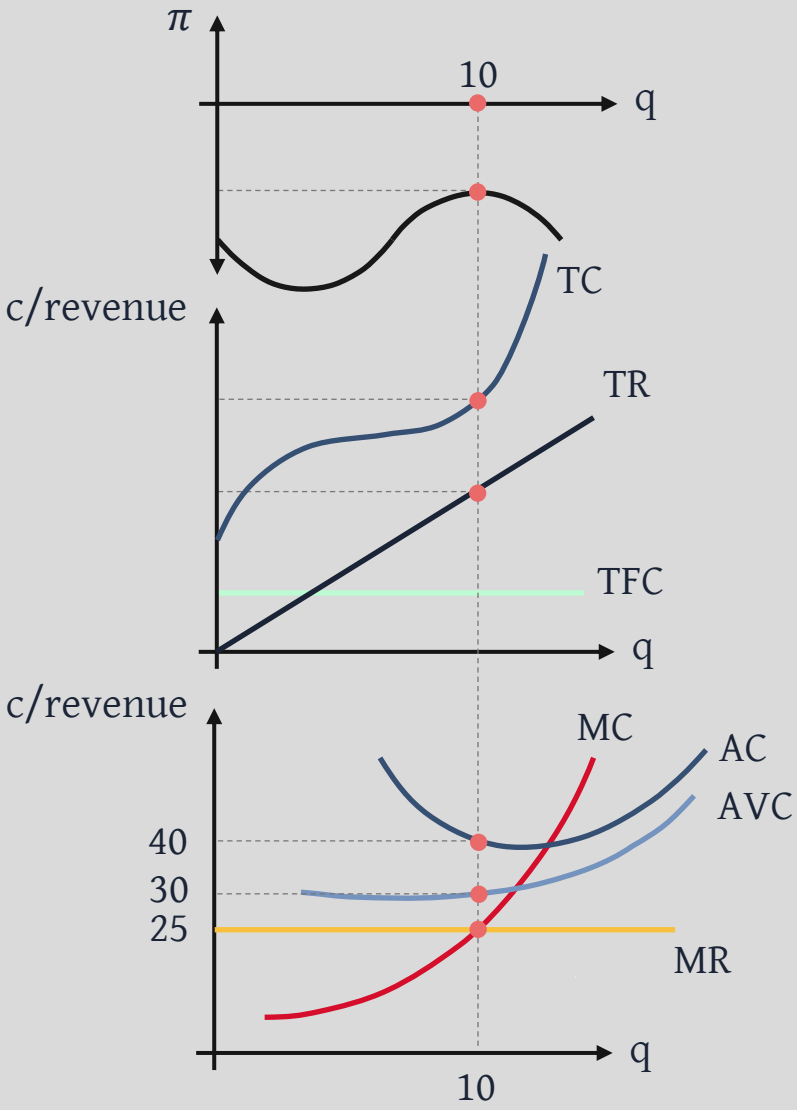
› π =

Then,

› TFC =

› TVC =

(4) Four scenarios: Shut down

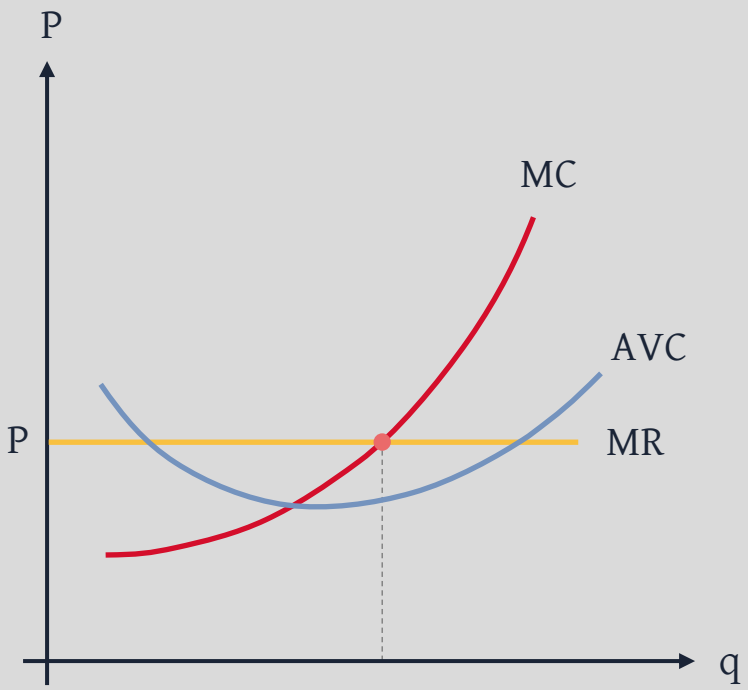


Therefore, we can conclude that at MR = MC when P < AVC, revenue is less than the variable costs.

Which means that there will be loss from utilizing variable factor as well and there is no part of the revenue that can be used for fixed cost.

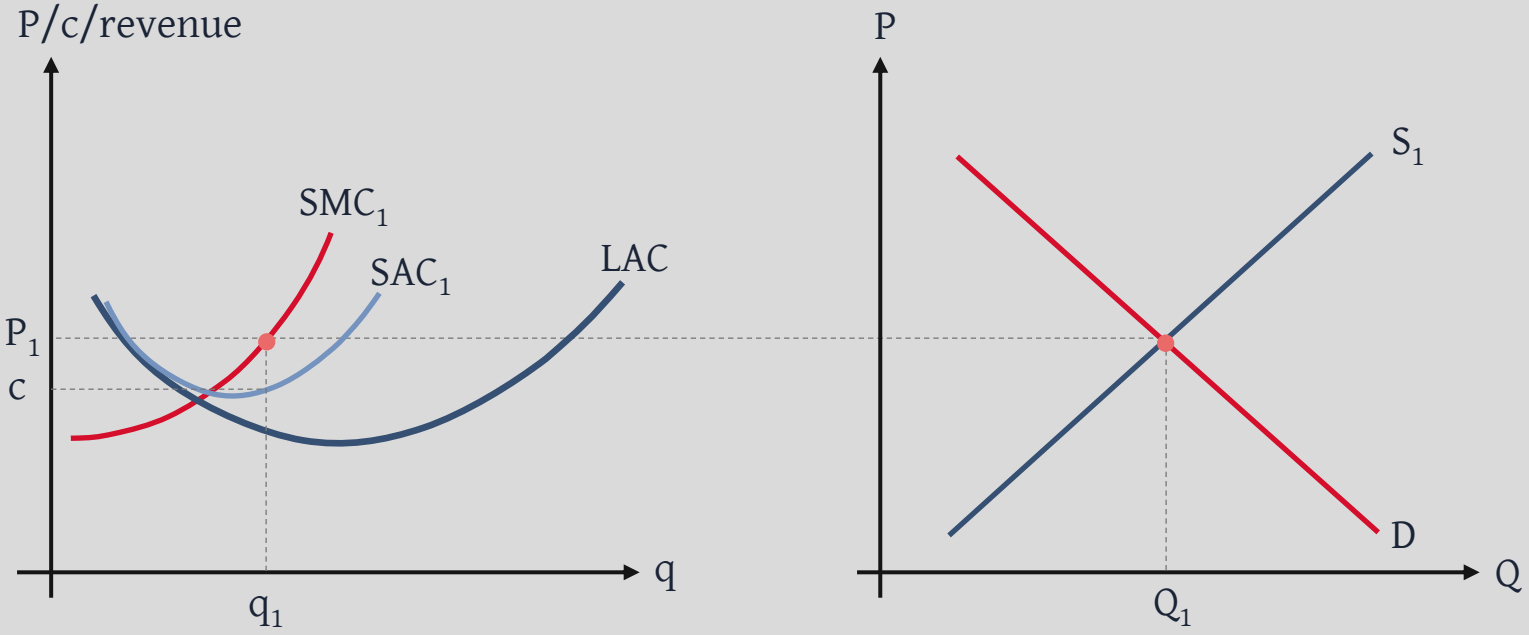
The decision for this firm will be producing at zero unit, or shut down, rather than take higher loss when producing at q*.

(5) Individual supply in the short-run



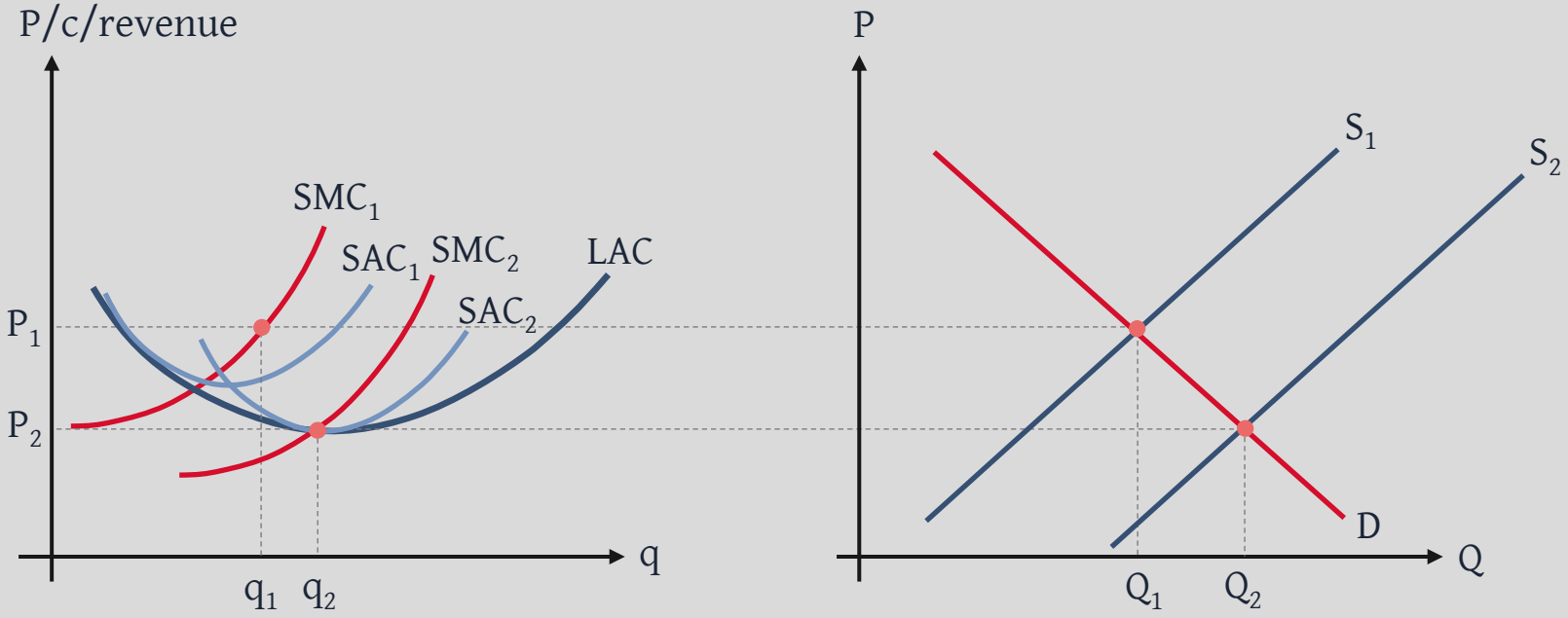
Supposed that cost structure of this firm remain the same, but there are changes in the market, causing price to rise or fall.

(6) Long-run equilibrium



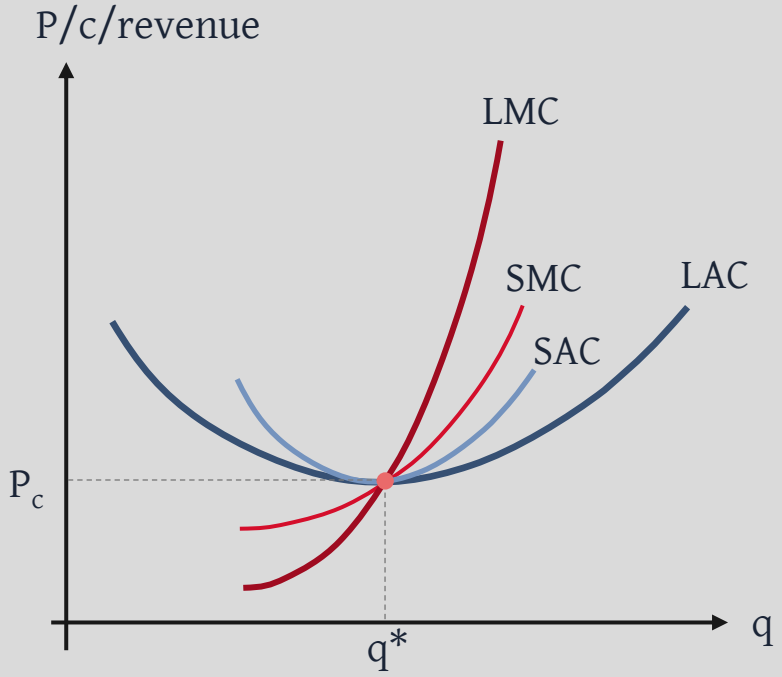
Now we turn to the long-run equilibrium for both firm and industry level. Consider this case when firms have excess profit in a market.

(6) Long-run equilibrium



If there is no barrier to entry, new competitors can compete in this market in the long-run.

(6) Long-run equilibrium



In the long-run, firms in perfect competition tend to receive normal profit, and achieve the lowest point of the average cost. Notice that

› P_c = LAC = LMC

(1) Characteristics

› There are many buyers but only one seller (Price maker).

› Product is rarely or cannot be substituted.

› Barriers to entry due to
- Monopolist possesses main factors of production or significant materials.
- Institutional devices accommodate for monopoly such as patenting or concession.
- Some products or service is efficiently produced by one producer or ‘natural monopoly’.

› Product differentiation

Example: can you list any product or service in monopoly market?

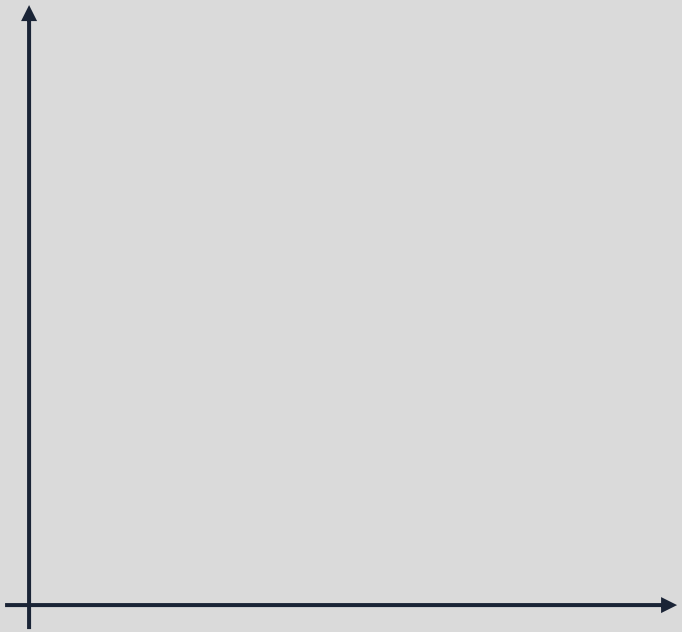
(1) Characteristics

As a price maker, monopolist can either choose only price or quantity. The following table should further define this characteristic.

Output (Q)	Price	Total revenue (TR)	Average revenue (AR)	Marginal revenue (MR)
1	25			
2	20			
3	15			
4	10			
5	5			
6	0			

Now let's graph this table and see what to see the relationship between demand and revenue curve.

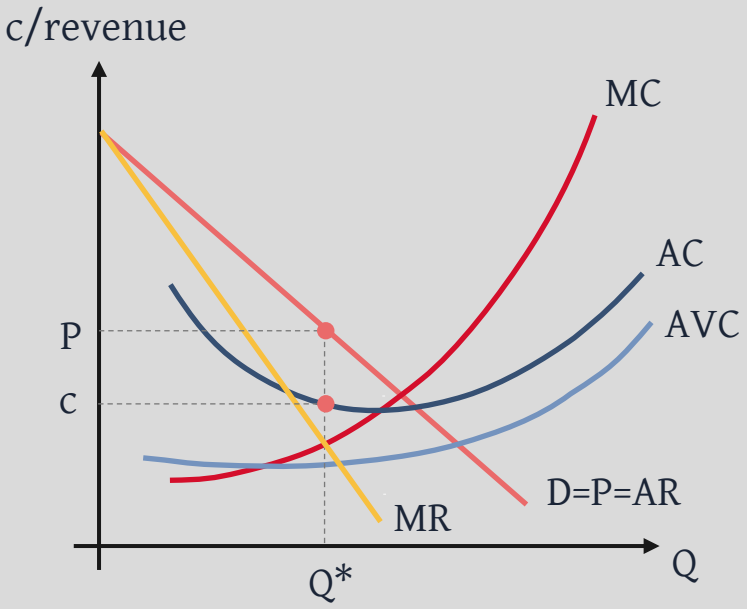
(1) Characteristics



Note: if demand is linear, marginal revenue is as twice as steep compared to demand.

› $D = P(Q) = 60 - 4Q$

(2) Monopolist in the short-run



Since considering revenue, cost and profit is similar to perfect competition, examples provided here are only a part of monopolist's scenarios. Monopolists can encounter four scenarios as firms in perfect competition.

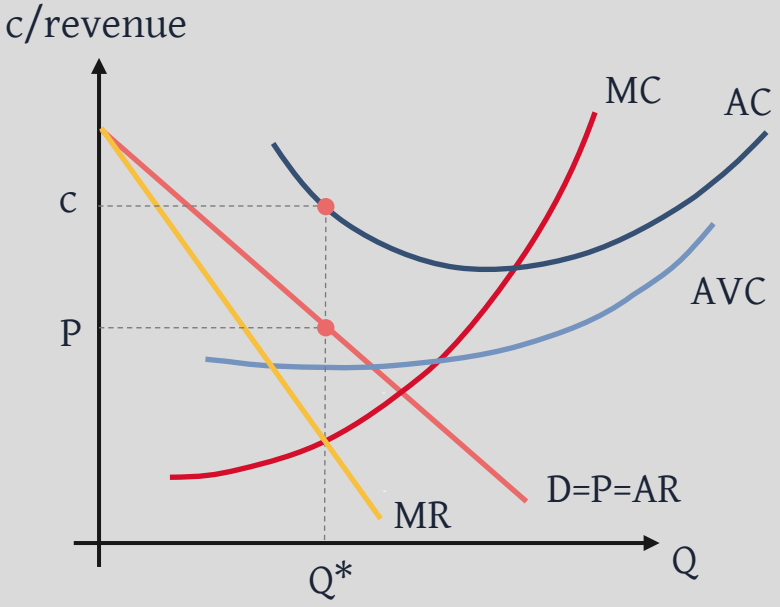
(1) indicate Q* where MR = MC and fix the quantity.

(2) Look for price per unit on the demand curve (D).

(3) Look for cost per unit on the average cost curve (AC).

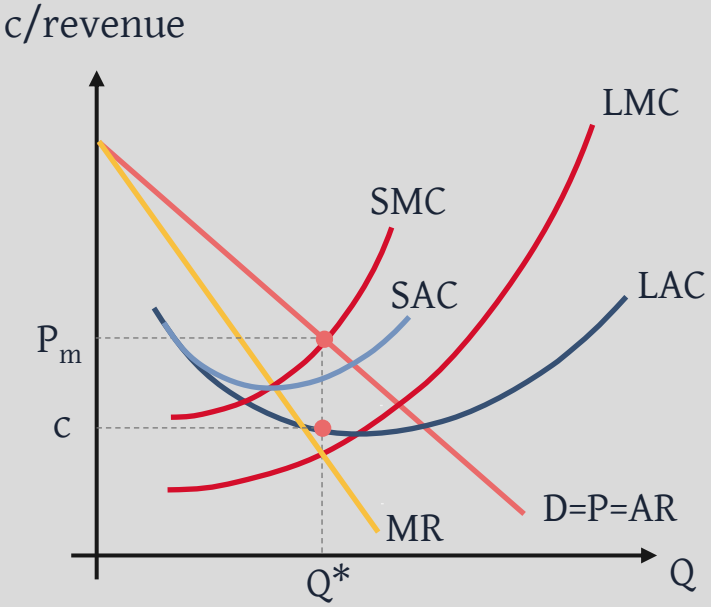
(4) See if monopolist gain or lose from the difference.

(2) Monopolist in the short-run



A monopolist can find themselves in the least loss situation as well as firms in perfect competition, but not very likely.

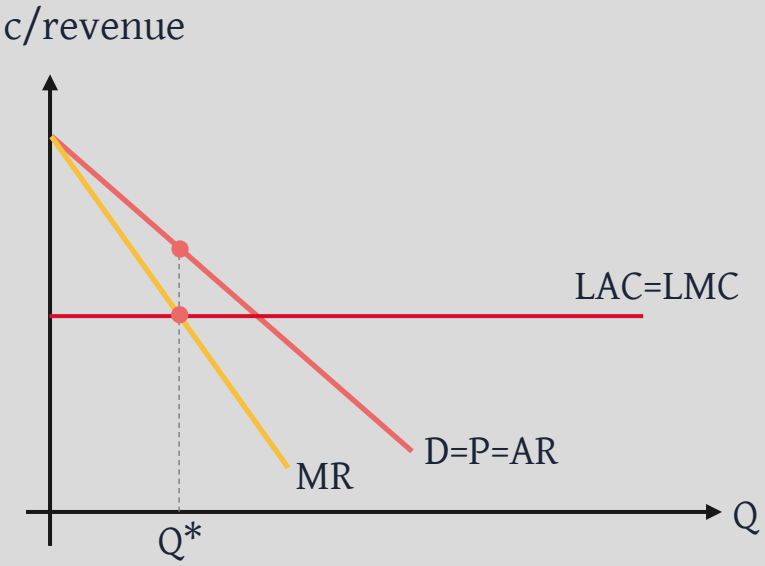
(3) Monopolist in the long-run



Since we have assumed that there are barriers to entry, monopolists tend to gain excess profit in the long-run, and therefore

› P_m > LAC > LMC

(4) Deadweight loss



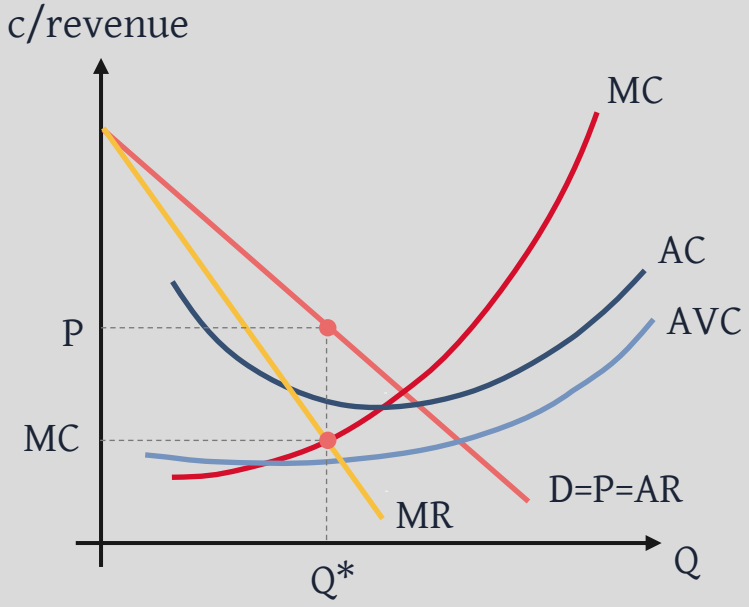
Let's compare perfect competition and monopoly. Assumed that there is no advantages from market structure.

Consider surplus if the market is

› Perfectly competitive

› Monopoly

(5) Measuring market power



We can measure market power using **Lerner's index** defined as

› $L = \frac{P-MC}{P}$ where L is the Lerner's index $L \in [0,1]$

› If $L = 0$, it means that $P - MC = 0$ or there is no difference between price and marginal cost as in perfect competition.

› If $L = 1$, it means that $P - MC = P$ or $MC = 0$, there is marginal cost for this monopolist. Therefore, it possess all the market power.

› L can be large due to high P or low MC.

(5) Measuring market power

Imagine that the more either the monopolist set the price high or push the cost low, the market power this monopoly possess.

Example : Supposed a monopolist selling bottled water at 10 baht per bottle, compare the Lerner's index when this monopolist marginal cost is at 3 and 5 baht per bottle.

(5) Measuring market power

Another method is not directly a measurement of market power, but rather **concentration of a market**, known as **Herfindahl-Hirschman index** (H).

› $H = \sum_{i=1}^{N} s_i^2$

where H is the Herfindahl-Hirschman index,

$s_i \in [0,1]$ is market share of each firm

N is total number of firms in a market.

Example : A sugar industry between two towns, town A and B, has 3 sellers in each town.

Market share in town A is 50, 30 and 20 percent for each seller.

Market share in town B is 90, 7 and 3 percent for each seller.

Show that the sugar in town B is more concentrated.

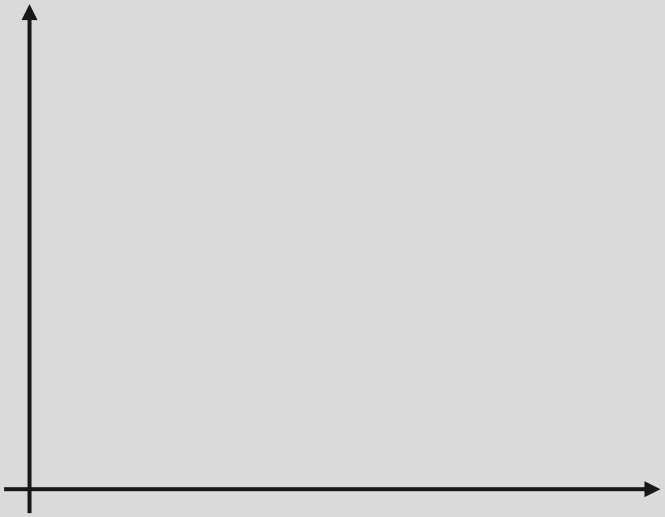
(6) Price discrimination

When a monopolist has market power and can earn excess profit in the long-run, monopolist can further manipulate market power to earn more profit.

Price discrimination is a tactic that monopolist manipulate market power to sell goods or services to different groups of consumer by characteristic of consumer, quantity, or time. They can set different price to gain profit from consumer surplus.

Price discrimination can be divided into three levels. There are also intertemporal price discrimination such as electronics devices at the beginning of its cycle can be sold at high price and cheaper later, or peak-load pricing such as plane tickets on weekdays and holidays.

(6) Price discrimination



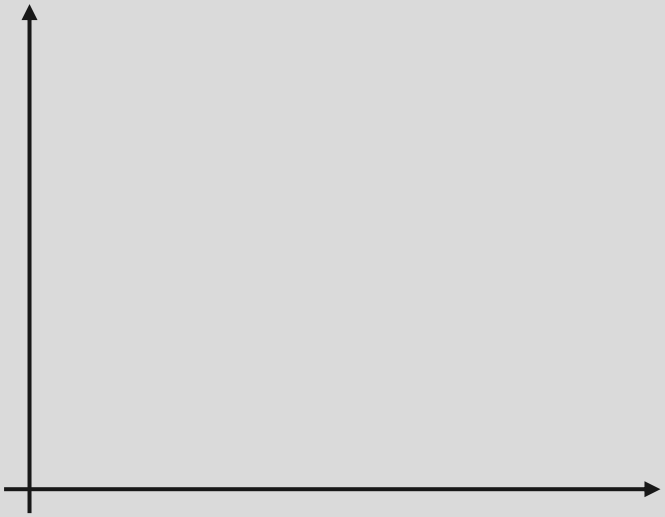
First-degree price discrimination

› Monopolist sets different prices to fit with all consumers' willingness to pay.

› Monopolist can earn all profit from consumer surplus.

› Monopolist needs to know all consumers' willingness to pay, hence, this is very unlikely practical.

(6) Price discrimination

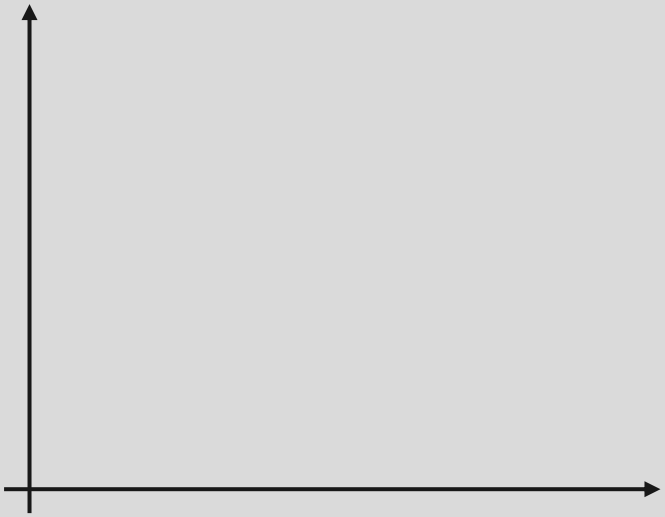


Second-degree price discrimination

› Monopolist can set prices differently for different numbers of sale.

› Monopolist can partially earn more profit from consumer surplus.

(6) Price discrimination



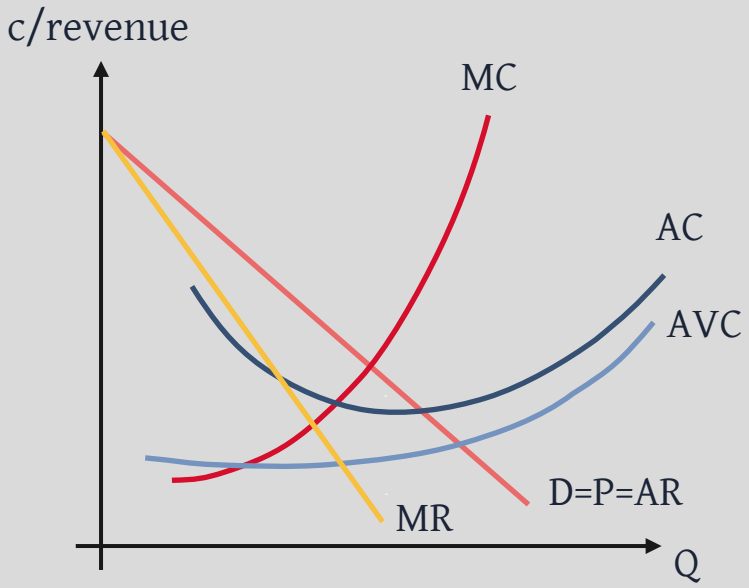
Third-degree price discrimination

› Consumers can be divided into at least two groups.

› Each group of consumers is differently elastic to price.

› Consumers cannot buy cheaply from one group to sell more expensively to another group. (Arbitrage)

(7) Breaking monopoly



Some markets are natural monopoly and most of them are public utility such as electricity, tap water, etc. Monopolists may be intervened to prevent taking advantage from consumers. Economic theory suggests two possible methods of price setting which are

› Ideal price : set price at $P = MC$

› Fair price : set price at $P = AC$

Setting the price to ideal price may sometimes, depending cost the cost of production, lead to loss of a monopolist. Policy maker should be careful that if the monopolist does not gain profit, product may not be remained in this market. Some subsidiary policies should also be coupled with price setting.

(1) Characteristics

› There are plenty of consumers and producers but not as many as in perfect competition.

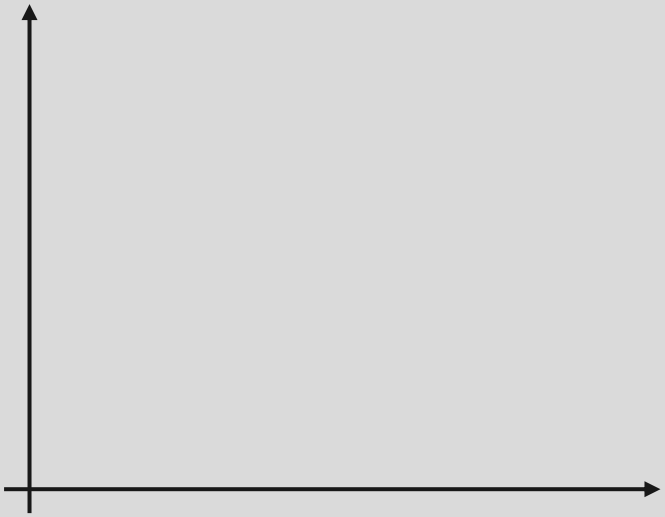
› Producers have market power, but not as much as in monopoly.

› There are minor differences between firms. Products can be easily substitutable.

› New firms can easily enter the market.

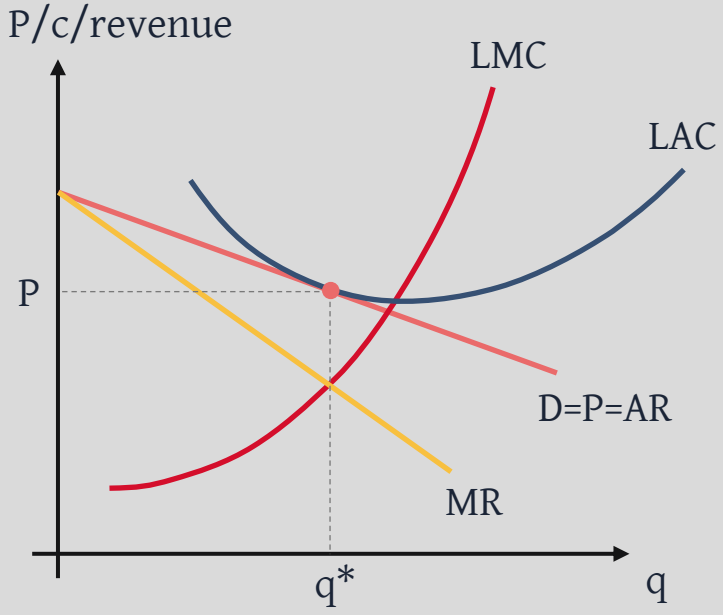
Example: can you list any product or service in monopolistic competitive market?

(1) Characteristics



Since the sellers in this market still gain some market power, but not as much compared to monopoly market, demand has a slight slope.

(2) Long-run equilibrium



As this market leans toward more onto perfect competition with many sellers and buyers, long-run equilibrium will be similar to the perfect competition but still

› $P_{mc} = LAC > LMC$

Characteristics

› Plenty of consumers but small number of producers. Oligopoly with two producers is called duopoly. Number of sellers needs not to be exact but rather depends on market share.

› Decision of one producer affects others' decision in the market

› Products can be both similar (Pure oligopoly) or differentiated (Differentiated oligopoly)

› Barriers to entry

Example: can you list any product or service in oligopoly market?