

Product Markets

Part 5

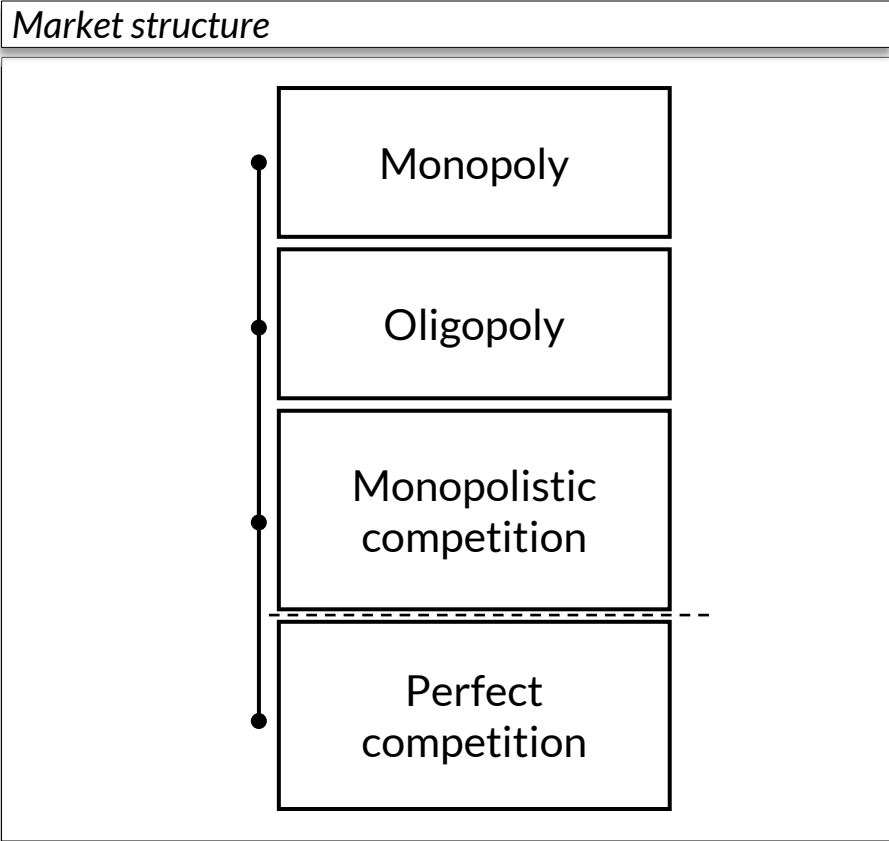
Understanding market

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 good:** 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.

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

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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

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

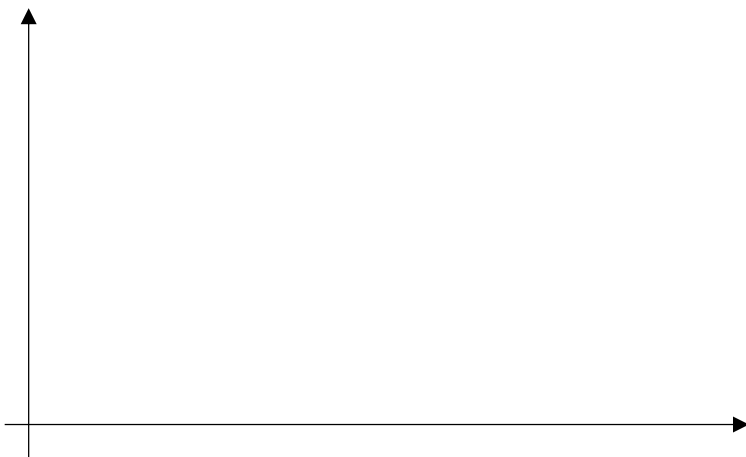
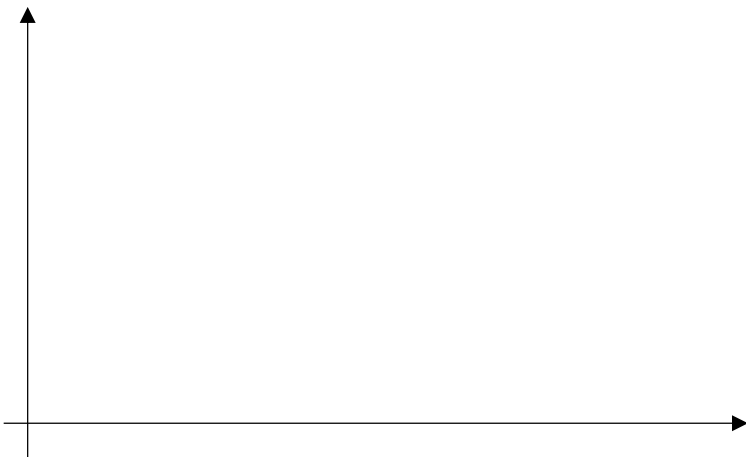
(1) Characteristics

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Comparing demand at firm and industry level



When price changes



(1) Characteristics

Since nobody has no market power to control price, we can define revenue and profit for sellers in this market

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.

Revenue and output				
(1) Output	(2) Price	(3) Total revenue	(4) Average revenue	(5) Marginal revenue
1	10			
2				
3				
4				
5				
6				

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

(2) Profit maximization condition

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Firm's revenue graph



- 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 initial idea?

Now we can further define profit and loss.

Definition 5.2

Profit (loss) is the difference between revenue and cost, denoted by π .

$$\pi = TR - TC$$

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

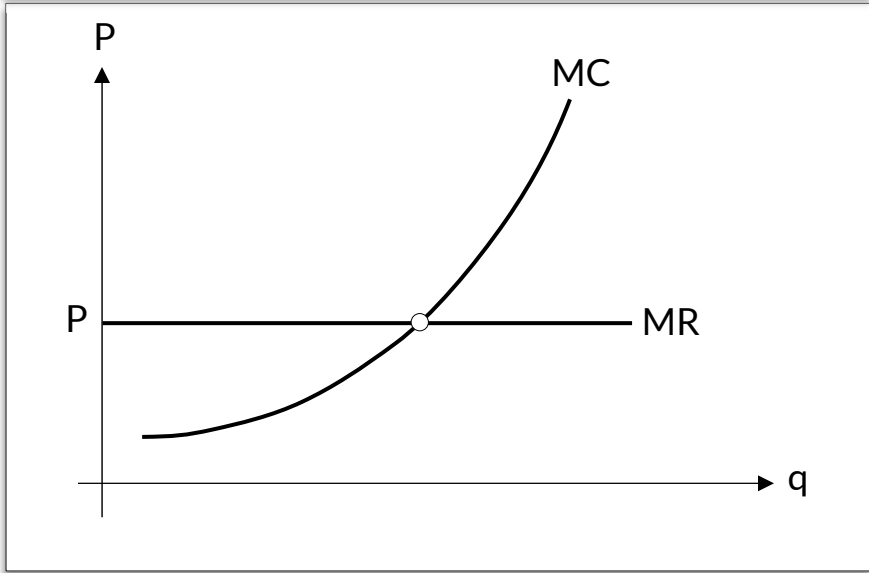
Since we assumed that a firm's goal is to maximizing profit, we can prove from a simple statement here.

- $\max_q \pi = TR - TC$

(2) Profit maximization condition

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

Figure 5.1: profit maximization condition

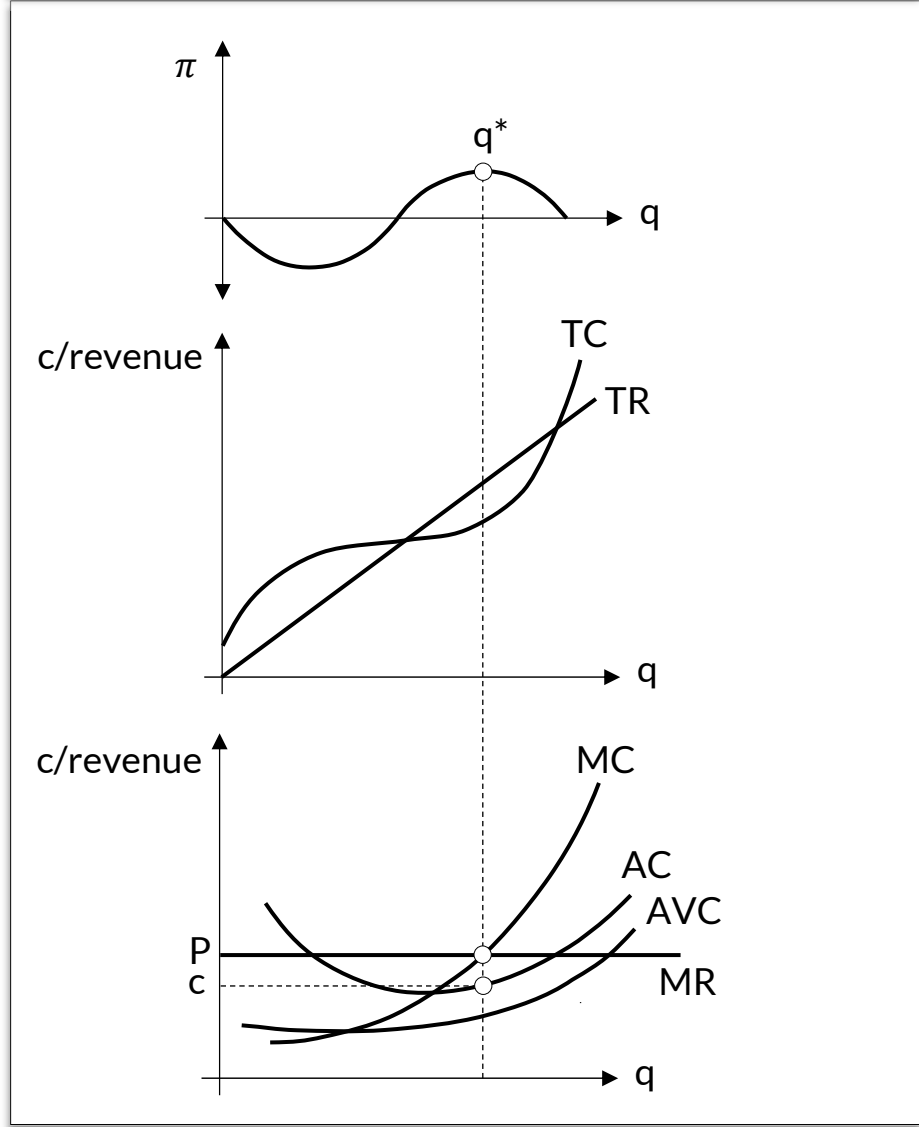


Consider when

- $MR > MC$
- $MR < MC$

Now let's consider all the graphs at once.

Figure 5.2: profit maximization condition

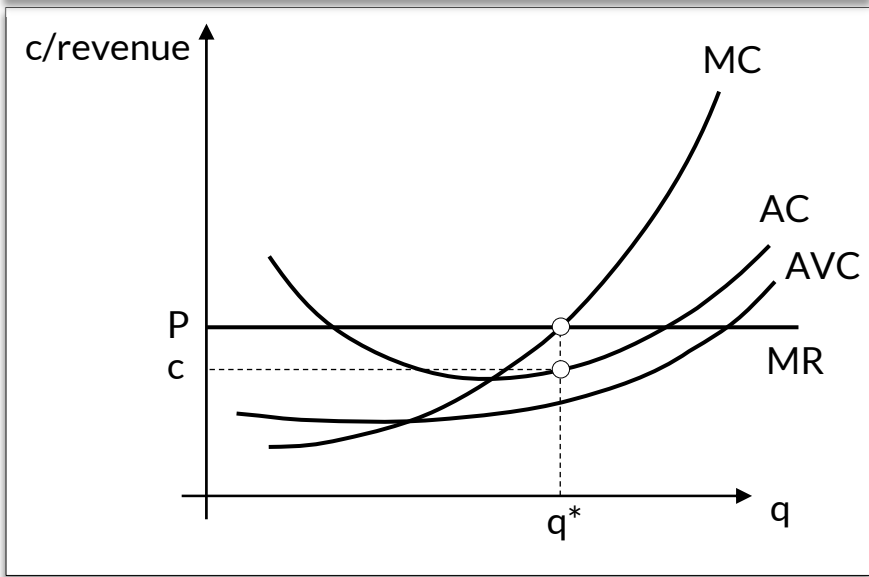


(3) The four scenarios

Firms in perfect competition may encounter four of these scenarios in the short-run.

- Excess profit
- Normal profit
- Loss but still operate (least loss)
- Shut down

Case 1: Excess profit



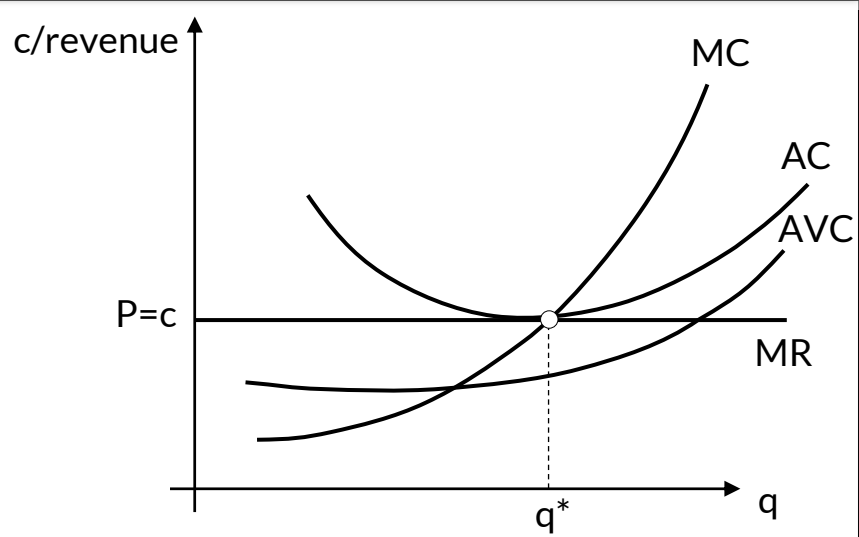
Consider cost, revenue per unit and profit

- Total revenue
- Total cost
- Profit

Noted that we only consider at the q^* , the amount of output that maximize firm's profit.

(3) The four scenarios

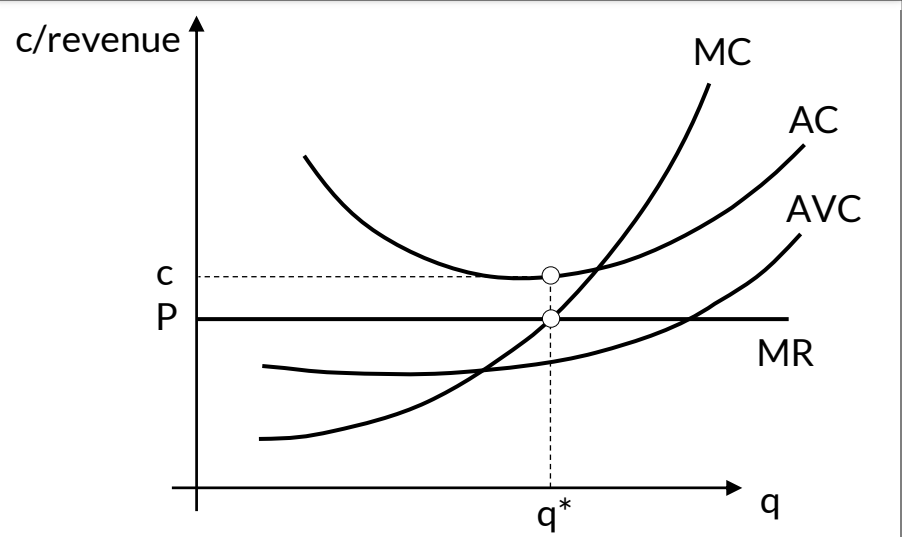
Case 2: Normal profit



Consider cost, revenue per unit and profit

- Total revenue
- Total cost
- Profit

Case 3: Least loss



Consider cost, revenue per unit and profit

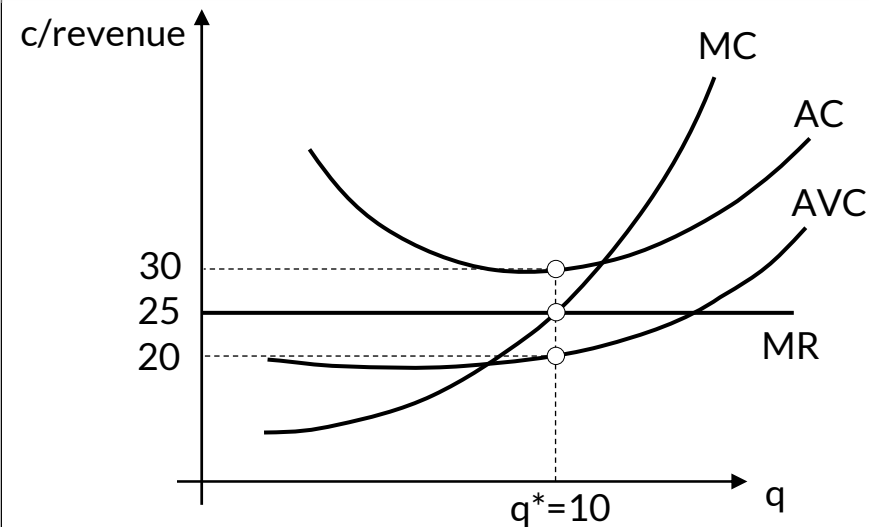
- Total revenue
- Total cost
- Profit

The question is why this firm still operates?

(3) The four scenarios

Now reconsider this case again, with figures.

Case 3: Least loss



Assumed that the price is at 25, while the cost is at 30 per unit, average variable cost is 20, and the optimal quantity is 10 units.

Now let's calculate cost and revenue.

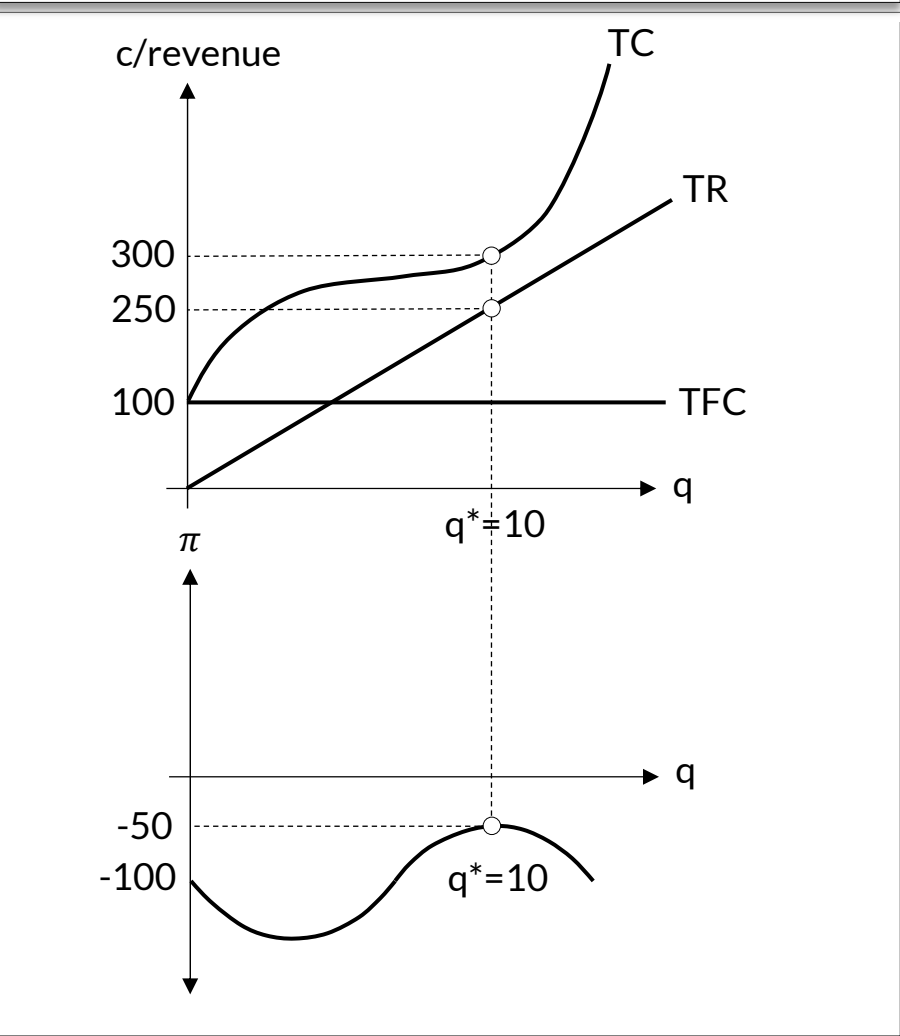
- Total fixed cost
- Total variable cost
- Total cost
- Total revenue

In summary, if $P > AVC$, total revenue can cover more than total variable cost. The remaining can cover a part of total fixed cost, which means that this firm loses less than paying fixed cost when producing $q = 0$.

(3) The four scenarios

Here is another look in total terms.

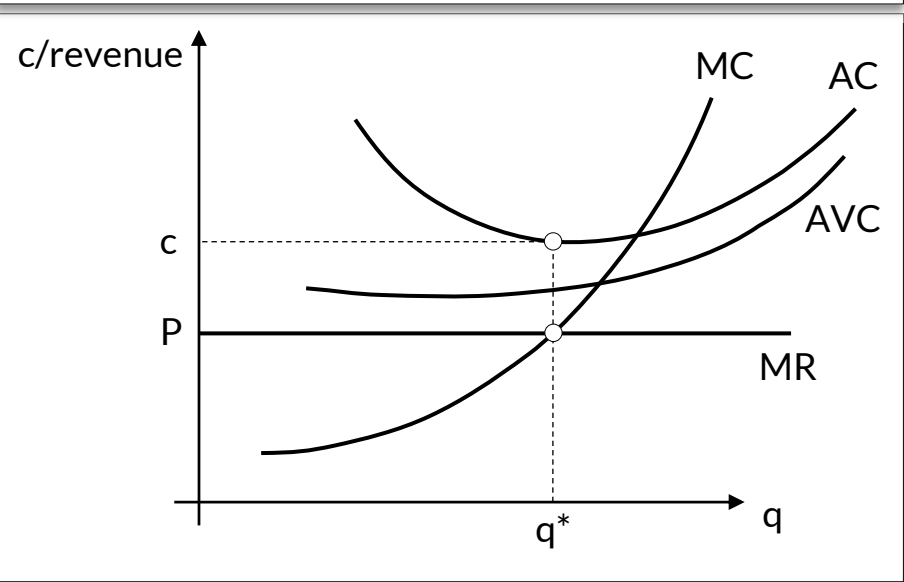
Case 3: Least loss



You can see that when this firm decides to produce at $q^* = 10$, it will lose less than producing at $q = 0$.

Now let's look at the last case of shutting down.

Case 4: Shut down

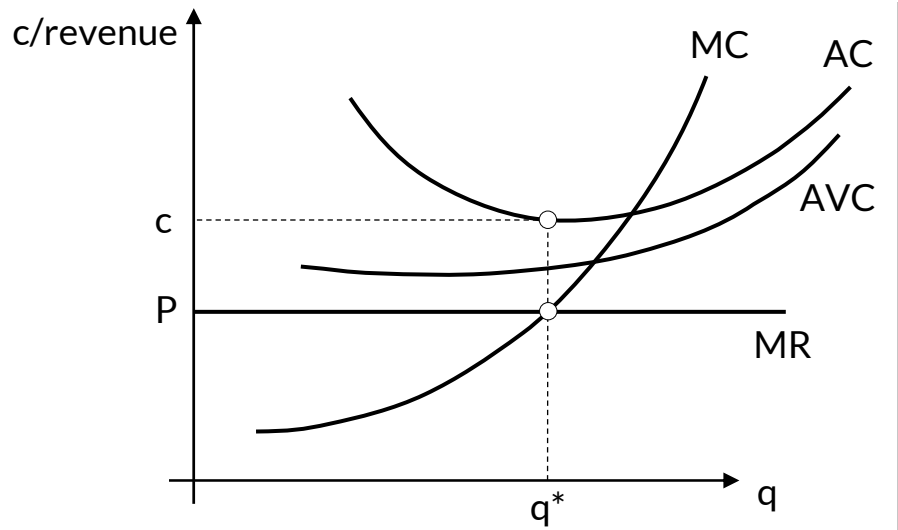


Calculate cost and revenue.

- Total revenue
- Total cost
- Profit

(3) The four scenarios

Case 4: Shut down

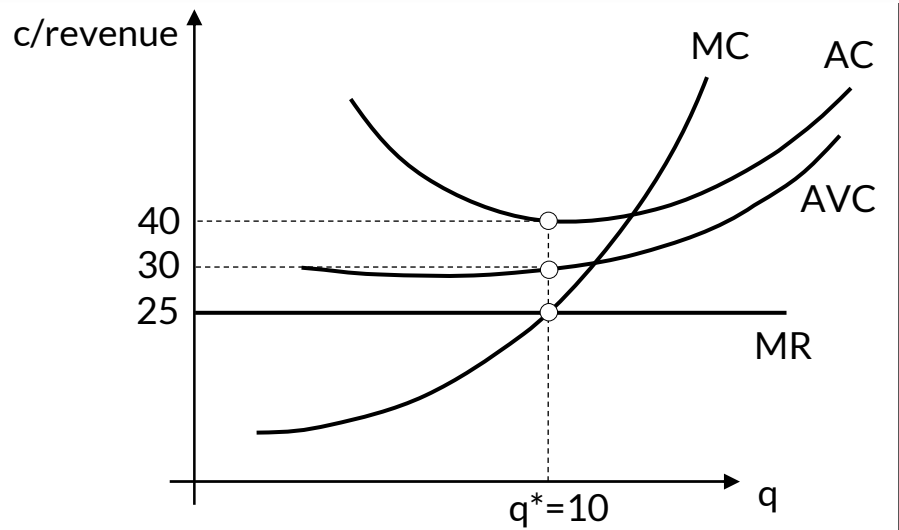


Calculate cost and revenue.

- Total revenue
- Total cost
- Profit

A further proof on this case, let's assume some figures.

Case 4: Shut down



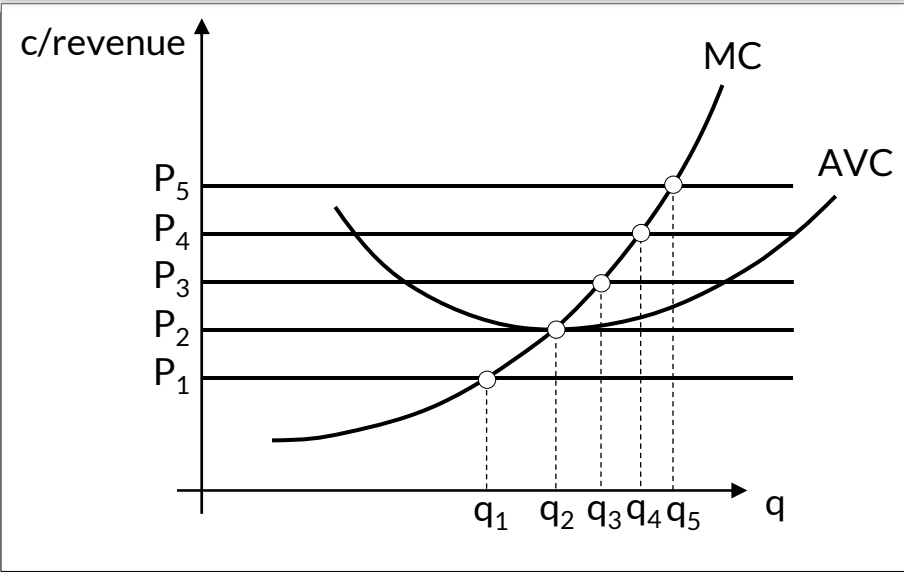
Now let's calculate cost and revenue.

- Total fixed cost and total variable cost
- Total cost and total revenue

It can be concluded that when $P < AVC$, this firm will shut down.

(4) Supply in the short-run

Deriving short-run supply



Now we know that when $P < AVC$, firm decides shutting down and leaves the industry. On the other hand, if $P > AVC$, firm remains in the business.

Let's assume that marginal cost remains the same while price can vary due to market situation, different price results in firm picking different optimal quantity.

On each level of price, we have a corresponding pair of order between price and quantity picked by a firm.

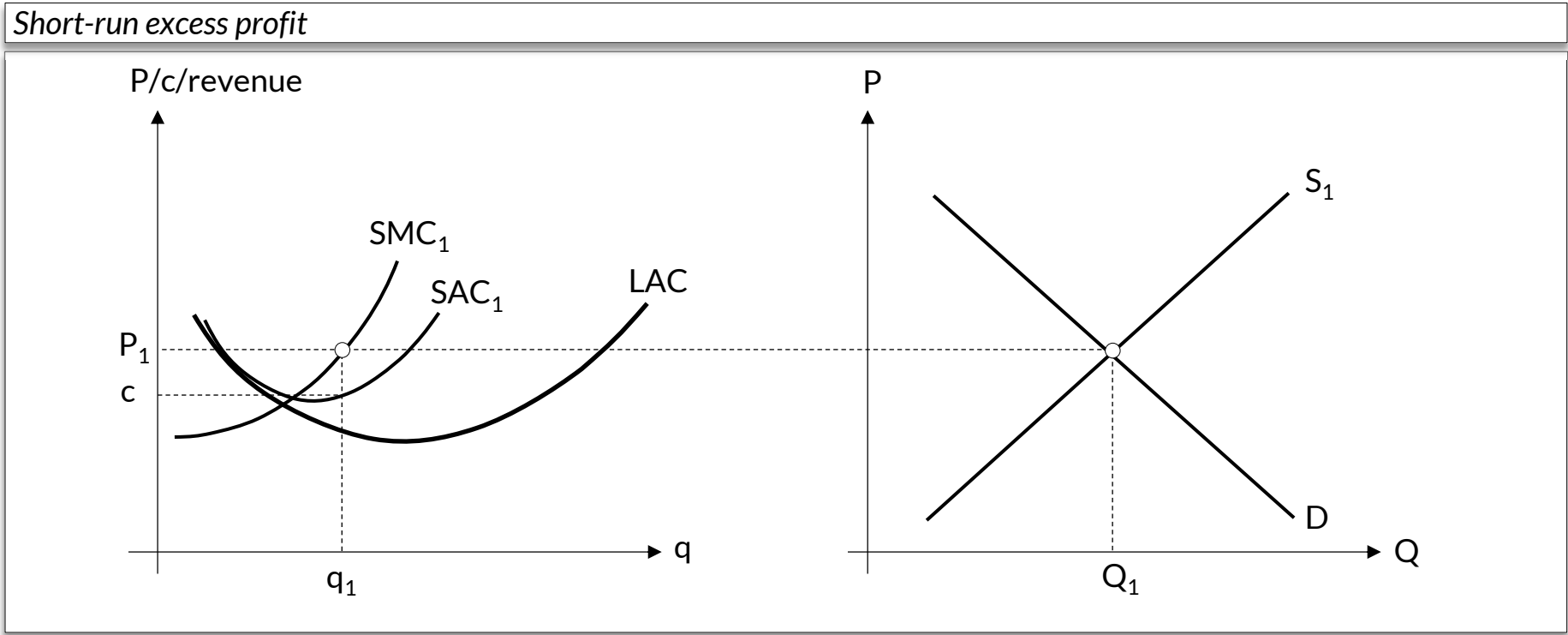
Therefore, we can say that, in the short-run, the marginal cost curve beyond AVC can represent supply curve for a firm.

To figure out supply of the industry, we sum up all the firms' supply to get a market supply.

(5) Long-run equilibrium

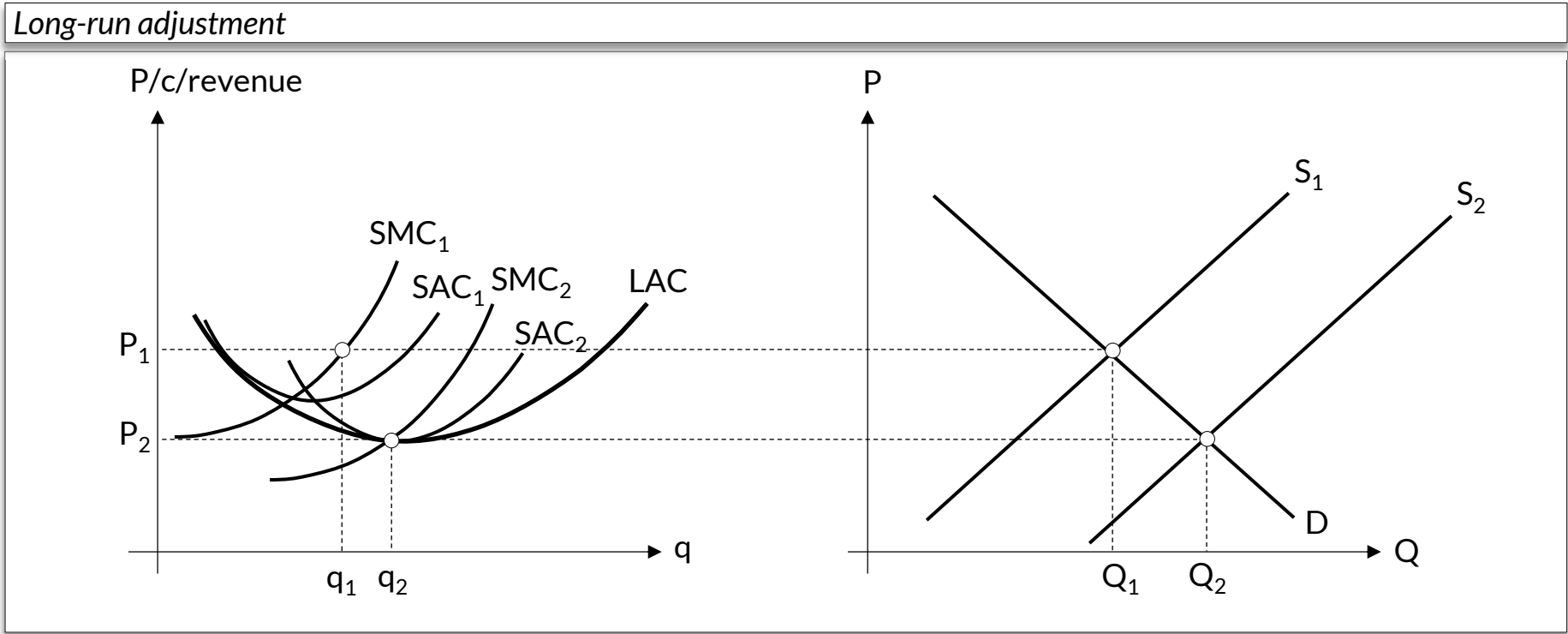
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What we studied so far were short-run equilibrium at firm's level. Now we turn to the long-run equilibrium for both firm and industry level. Consider this case when firms have excess profit in a market.



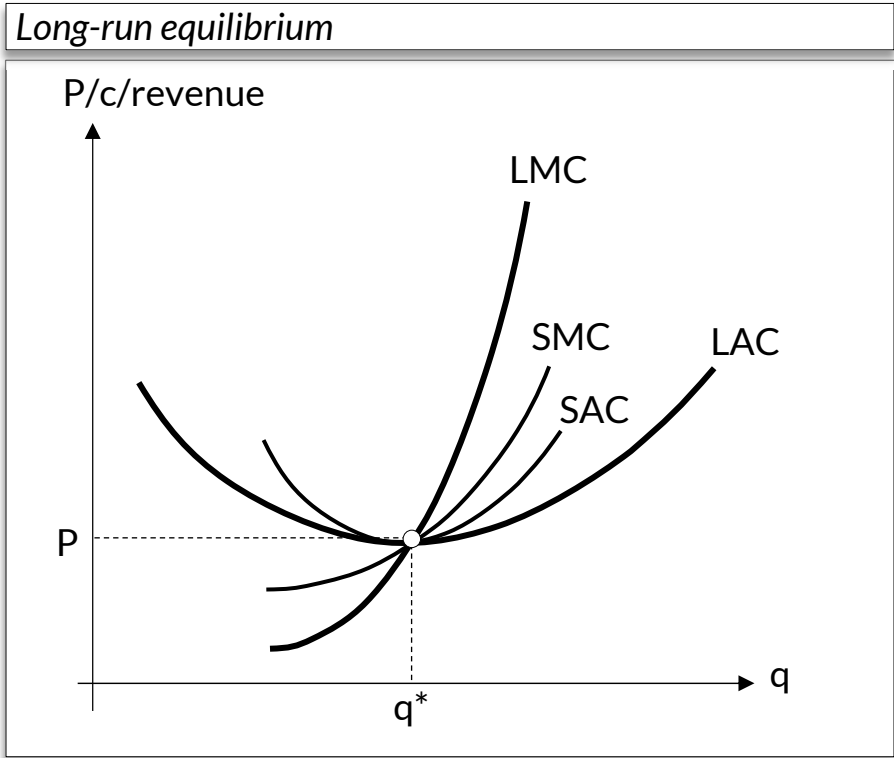
(5) Long-run equilibrium

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



(5) Long-run equilibrium

What we studied so far were short-run equilibrium at firm's level. 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.



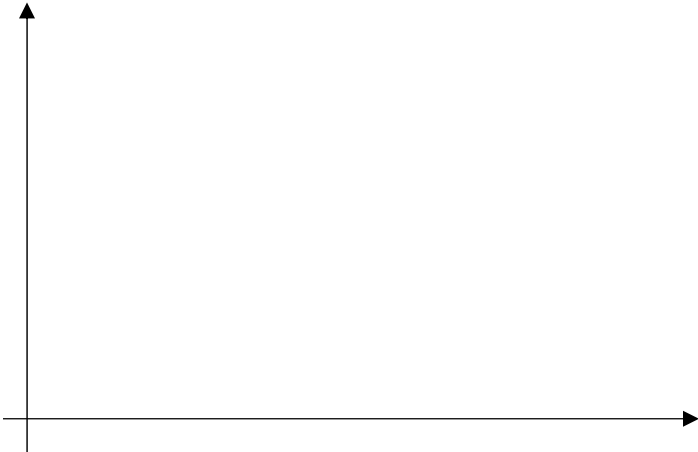
(1) Characteristics

- 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 tools 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

Comparing demand at firm and industry level



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

Table 5.2: Revenue and output in monopoly

(1) Output	(2) Price	(3) Total revenue	(4) Average revenue	(5) Marginal revenue
1	25			
2	20			
3	15			
4	10			
5	5			

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

(1) Characteristics

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

- $D = P(Q) = 60 - 4Q$

Since considering revenue, cost and profit is similar to perfect competition, examples provided below is only a part of monopolist's scenarios. Monopolists can encounter 4 scenarios as firms in perfect competition.

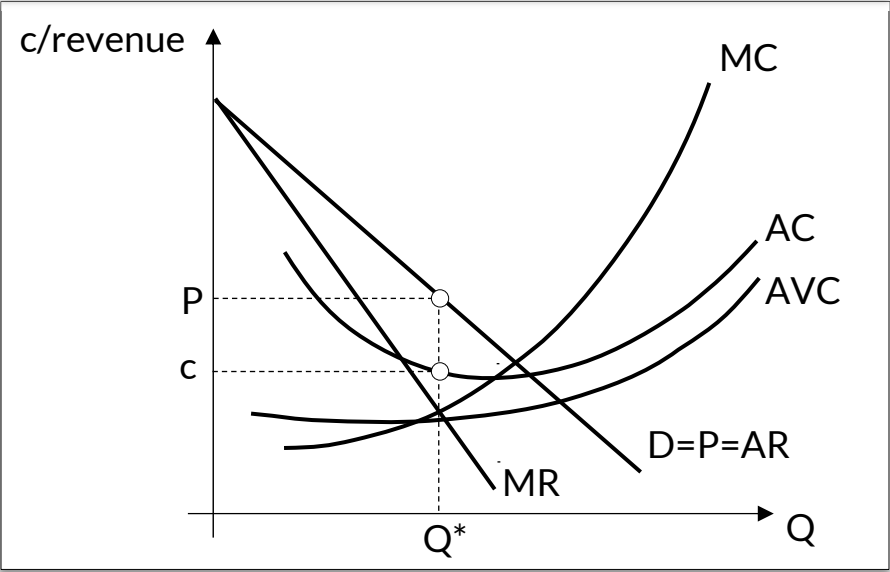
Demand and revenue curves



(2) Monopolist scenarios

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Case 1: Excess profit in the short-run



Calculate cost and revenue.

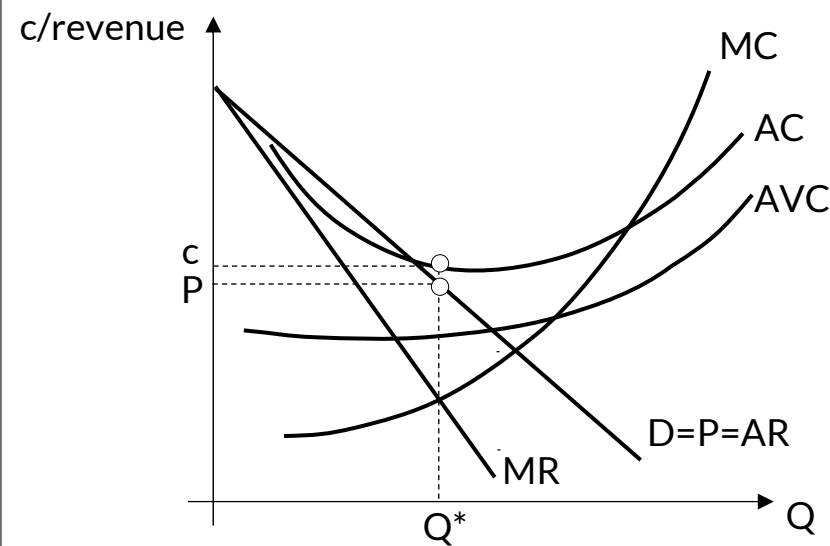
- Total revenue
- Total cost
- Profit

Steps:

- (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 scenarios

Case 2: Least loss in the short-run



Calculate cost and revenue.

- Total revenue

- Total cost

- Profit

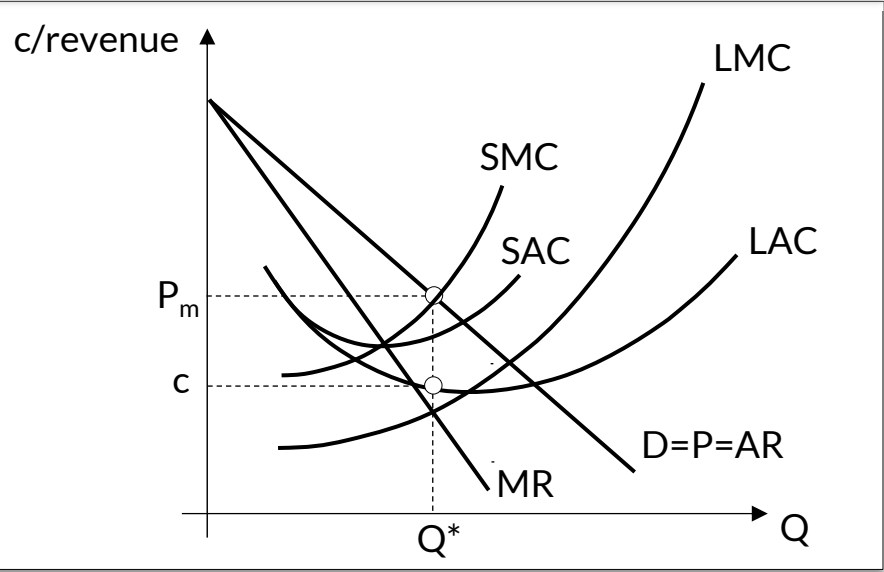
Steps:

- (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 scenarios

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Long-run Equilibrium



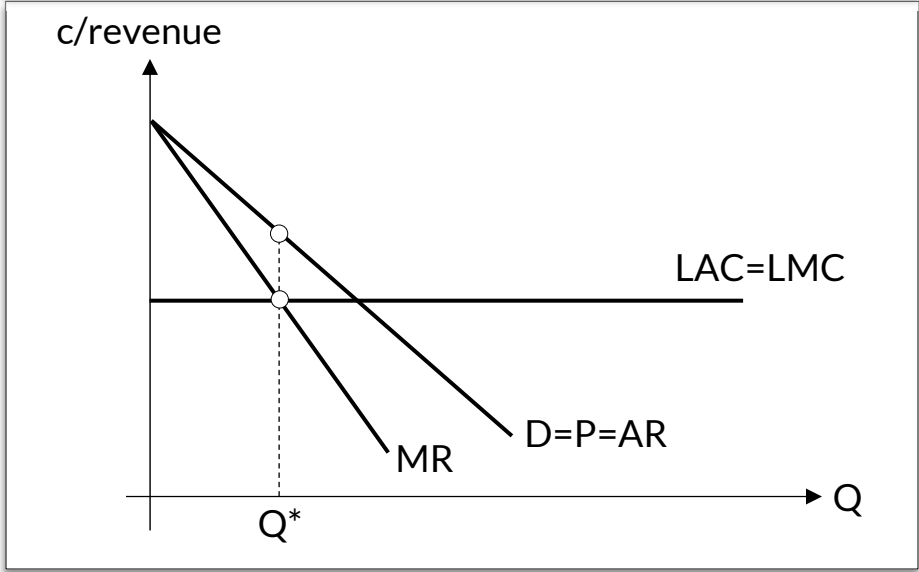
Since we have assumed that there are barriers to entry, monopolists tend to gain excess profit in the long-run, and therefore

• $P_m > LAC > LMC$

What does the inequality mean?

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

Deadweight loss in a monopoly



Consider surplus if the market is

- Perfectly competitive
- Monopoly

(3) Price discrimination

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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 by price discrimination.

Definition 5.3

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.

First-degree price discrimination



- Monopolist set 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.

(3) Price discrimination

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Second-degree price discrimination

- Monopolist can set prices differently for different numbers of sale.
- Monopolist can partially earn more profit from consumer surplus.

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)

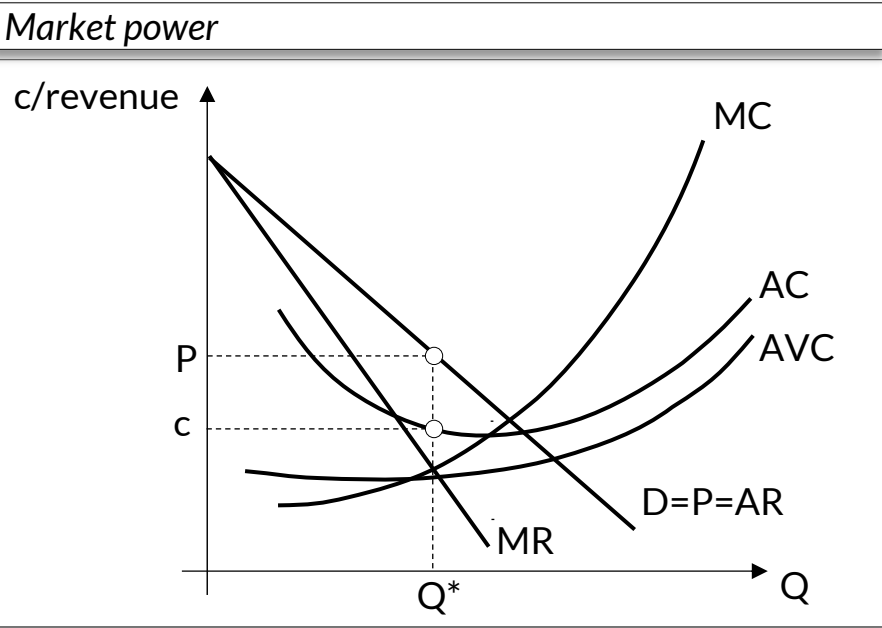
(4) Measuring market power

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.

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.



(4) 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.

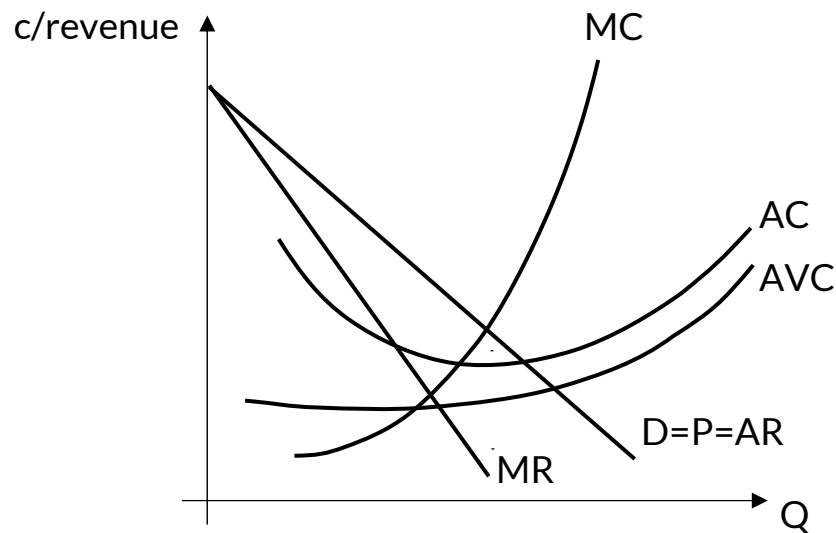
Show that the sugar in town B is more concentrated.

(5) Breaking monopoly power

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 $P = AC$

Ideal and fair price



Setting the price to ideal price may sometimes, depending on the cost of production, lead to the loss of a monopolist. Policy makers should be careful that if the monopolist does not gain profit, the 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?

(2) **Equilibrium in the long-run**

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

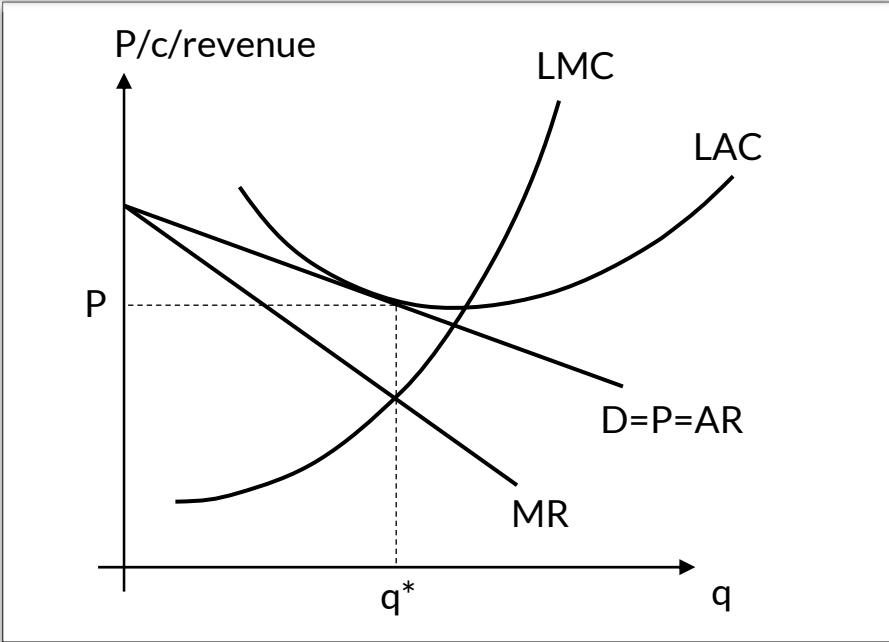
Demand in monopolistic competition



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

• $P_{mc} = LAC > LMC$

Long-run equilibrium in monopolistic competition



(1) Characteristics

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- 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?

(2) Hotelling's model

Since the decision of a producer would affect to other producers in the market due to large market share, there is no model that can entirely generalize the producers' behavior in oligopoly.

Pricing strategy, quantity selection, behavior of producer, and interaction of the competitors in the market are mostly resulted from those decisions.

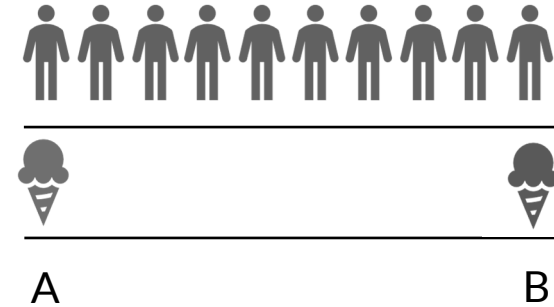
Examples of models in the oligopoly are as follows:

- Price leadership model
- Cartel model
- Hotelling's model
- Game theory

First, we should study a very basic Hotelling's model.

Assumed that there are 2 ice cream parlors (A,B) which can set their store on the horizontal plane, there are 10 people lined up and both stores sell the same price and quality of ice cream. Therefore, people will decide to buy from which parlor depending only on distance between them and a parlor. What is the producers' equilibrium location if both A and B can choose alternately.

Figure the equilibrium



(3) Game Theory

Game theory is a tool for studying behavior of player’s decision for each side. In each game, there are components as follows:

- Players – In the situation of interest, who are involved?
- Rules – What are the rules for that game, such as who plays first?
- Payoffs – How the decision affect the result?
- Information – What information of each player possess?

Study the behavior of the players will lead to the equilibrium of each game for understanding of the behavior of the players under given condition and result of the game.

Suppose that in the sliced bread market, there are 2 manufacturers (A,B). Each of them earn profit from selling bread as the table below (unit: million Baht) under circumstances of considering to broadcast an online advertising or not since advertising has a cost which can reduce profit but also may generate some return.

Payoff matrix of an advertisement game

		B	
		Advertise	No advertise
A	Advertise	20 , 10	25 , 12
	No advertise	23 , 16	30 , 18

Profit of producer A , B

(3) Game Theory

If we impose an assumption that the players are rational, always seeking the highest benefit. Players will choose whatever yields the best result for themselves without paying attention to what the other party will choose. This is called "Dominant strategy" of those players.

- **Dominant strategy** is a strategy that is better than another strategy for one player, no matter how that player's opponents may play.

There exist a dominant strategy equilibrium when players all have a dominant strategy. Consider the example in the advertising game.

Now consider the same game, see if there is any dominant strategy for each player, regardless another player's strategy.

Payoff matrix of an advertisement game

		B	
		Advertise	No advertise
A	Advertise	20 , 10	25 , 12
	No advertise	23 , 16	30 , 18

Profit of producer A , B

(3) Game Theory

However, for some games, there may not be a dominant strategy for both players. For example, the turning game below. There are 2 players (A, B) walking towards each other from opposite direction. Both want to walk through each other without colliding. The payoffs matrix are shown here.

From the table, both players do not have a dominant strategy because the outcome of the game depends on the decision another player. Another criteria is needed to figure out an equilibrium.

- **Nash Equilibrium** is the result that no player has the motivation to choose otherwise or change their strategy, while considering other players' options.

Is Nash equilibrium also a social optimum? The 'Prisoners' dilemma' can prove as a counter example.

		Turning game	
		B	
A	Left	1, 1	-1, -1
	Right	-1, -1	1, 1
		Satisfaction of A , B	

(3) Game Theory

Prisoners' dilemma

		B	
		Confess	Silent
A	Confess	8 , 8	0 , 20
	Silent	20 , 0	2 , 2

Jail time of A , B

Assumed that there are 2 suspects (A, B) being arrested for committing an offense together, two suspects were separately investigated. If one suspect accepts the confession, suspect will be barred as a witness and released.

Both suspect acknowledge the results of this situation and the payoffs matrix, but there is no way to know what the other suspect will choose.

Can you apply the concept of Nash equilibrium to solve this game? Is the result(s) the social optimum?

Factor Markets

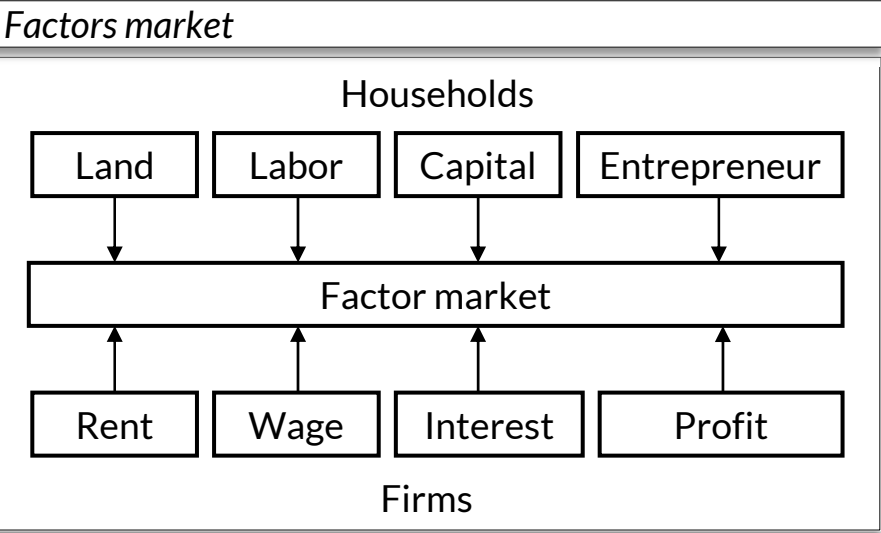
Part 6

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Principles of Microeconomics
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Understanding factor market

Similar to the product markets, factor market is a context where factors of production are ‘traded’. The opposing aspect of these markets is the position of buyers and sellers

Firms now demand factors of production for their production process while households are willing to supply their factors of production. In return, households get compensation back as the opportunity cost. In other words, price is still a mechanism to settle down the agreement for those who demand and supply the factors.



Factor market and product market are connected in almost every possible ways. Let’s consider these examples.

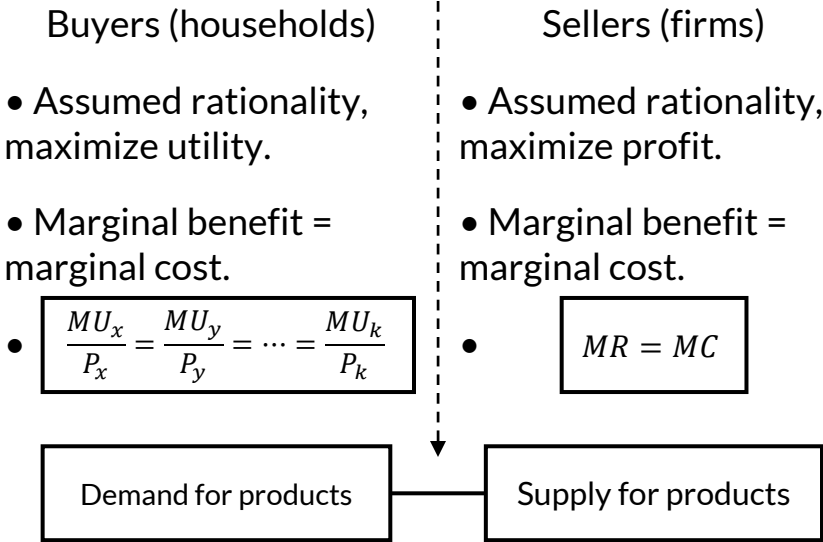
- If middle classes in urban area grow in size, meaning that their purchasing power increases. There can be more demand for accommodations, leading to a higher demand for construction service, and lastly, more demand for labors which results in increasing wage.
- Assumed that the Bank of Thailand increases policy rate, both saving and lending rate also increase. The opportunity cost for capital becomes higher resulting in higher products and services price.

Methods used to study factor market are very similar to product market. Following Neoclassical school of economics, we rely on marginal analysis to study demand and supply side as we did in the previous chapters. Comparing with product market would portray how we are going to deal with this market, illustrated below.

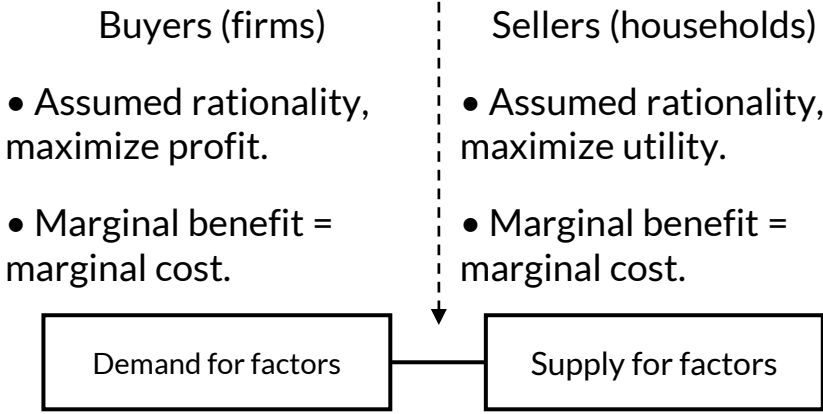
Understanding factor market

Product market vs factor market

Product market



Factor market



Therefore, the study will follow as usual, by considering demand for factors of production at first.

Definition 6.1

Demand for factors of production is quantity of factors of production demanded by firms, at different level of price in a period of time.

The interesting aspect of this demand for factors is that it is called ‘**derived demand**’, meaning that this demand is derived from product demand, instead of genuinely demanded by firms. Logic of studying demand is as follows.

- Firms demand factors of production for their production process, while seeking to maximize profit in product market.
- Having more quantity of factors leads to more output, while also increases the cost of production.
- A criterion to decide how many number of factors of production should be utilize depending on

Marginal benefit: how much revenue gain from having an increment unit of factor = **Marginal cost:** how much does it cost to have an incremental unit of factor.

(1) Marginal revenue product

For simplicity, firms only utilize capital and labor for their production. Hence, mainly we will focus on labor as in the short-run, labor is more flexible and most of the time we take labor as a variable factor.

Product market plays a very important role here. A firm in a perfectly competitive market and a monopoly has different level of market power. Hence, we define another variable to measure ‘value’ of product below.

Definition 6.2

Marginal revenue product is additional revenue that a firm receive, from selling marginal product, when an incremental unit of factor is added into production process, defined as

$$MRP = MP \times MR$$

where

MP is marginal product from an incremental factor
MR is marginal revenue from selling a product.

Definition 6.3

Value of marginal product is the value of the marginal product in a market when an incremental unit of factor is added into production process, defined as

$$VMP = MP \times P$$

where

MP is marginal product from an incremental factor
P is price of product in a market.

Example : In a perfect competition, $MR = 10$. Hiring 1 more unit of labor yields 2 units of marginal product. Find the *MRP*

Example : In a perfect competition, $P = 10$. Hiring 1 more unit of labor yields 0.5 units of marginal product. Find the *VMP*

What if a firm hires 2 more units of labor resulted in 3 united of marginal product, find the *MRP*.

(2) **Difference between perfect competition and monopoly (product market)**

We firstly need to imposed an assumption that

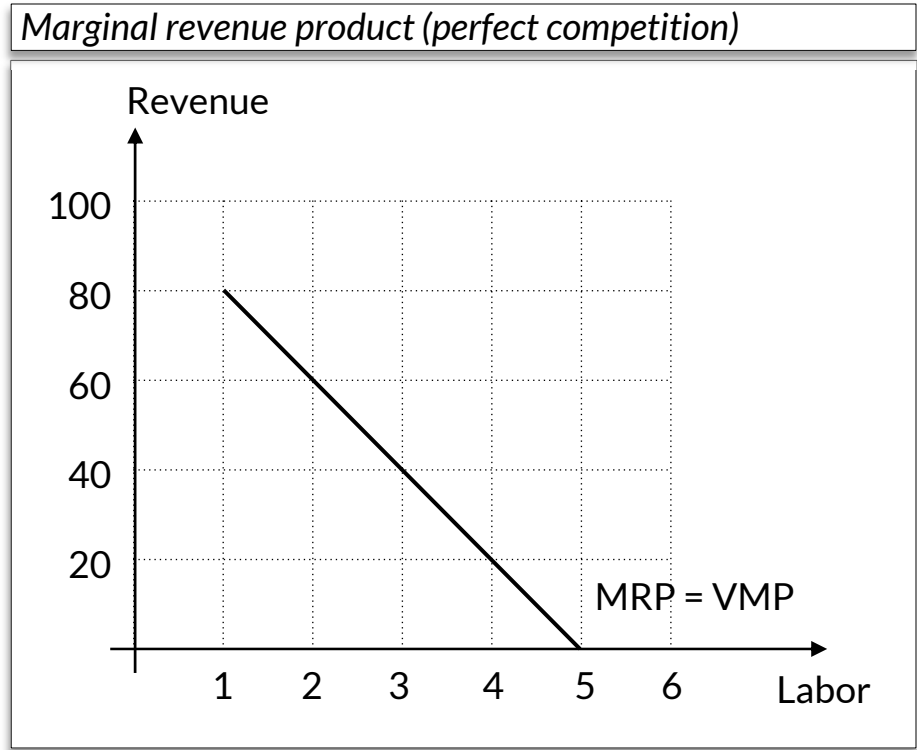
- Factor market is perfectly competitive.
- Product market can be both perfect competition or monopoly.

For perfect competition, we can be sure that $MRP = VMP$ since $MR = P$. However, for a monopoly case, $MR < P$, and therefore, $MRP \neq VMP$. See the example of tables and plots below.

Perfect competition

(1) <i>L</i>	(2) <i>q</i>	(3) <i>MP</i>	(4) <i>MR</i>	(5) <i>MRP</i>	(6) <i>VMP</i>
0	0	-	-	-	-
1	8		10		
2	14		10		
3	18		10		
4	20		10		
5	20		10		
6	18		10		

Since we are considering only labor, we are going to plot a relationship between MRP and L as follows.



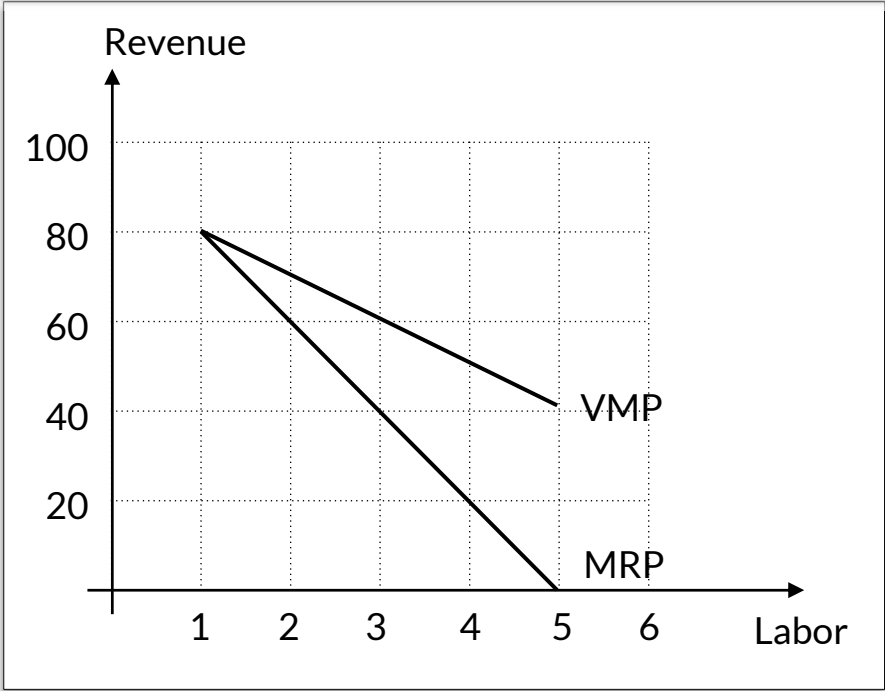
What would happen to MRP when price increases while marginal product remains constant?

Recall that in a monopoly market, price and marginal revenue are two separate lines, resulting in $MR < P$ and $MRP < VMP$ as portrayed in the follow figure.

(2) Difference between perfect competition and monopoly (product market)

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Marginal revenue product (monopoly)



Value of the product exceeds marginal revenue for a monopoly, implying that if a monopoly set the optimal quantity when $MR = MC$, the marginal cost compensated for factors of production is less than the market value of the product. This can be considered as an ‘**exploitation**’. We can see this concept clearer when we explore firm’s equilibrium.

Let’s go back to analyze perfect competitive market, we have the marginal benefit part already. So, another part is the marginal cost, defined as

Definition 6.4

Marginal factor cost is marginal cost for adding an incremental unit of factor into the production.

$$MFC = \frac{\Delta TFC}{\Delta L}$$

where
 TFC is total factor cost
 L is number of factor (in this case, labor)

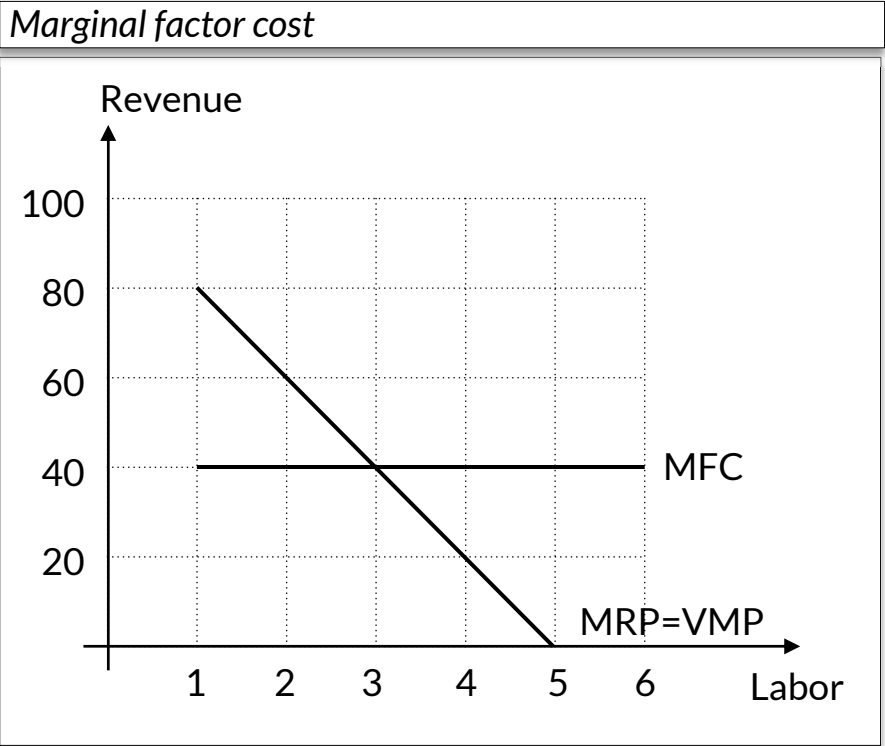
Example : In a perfect competition, given that wage is 350 baht a day, find the MFC when a firm hires 2 more units of labor.

We can also, for the case of labor, define that

- $MFC =$

(3) Marginal factor cost

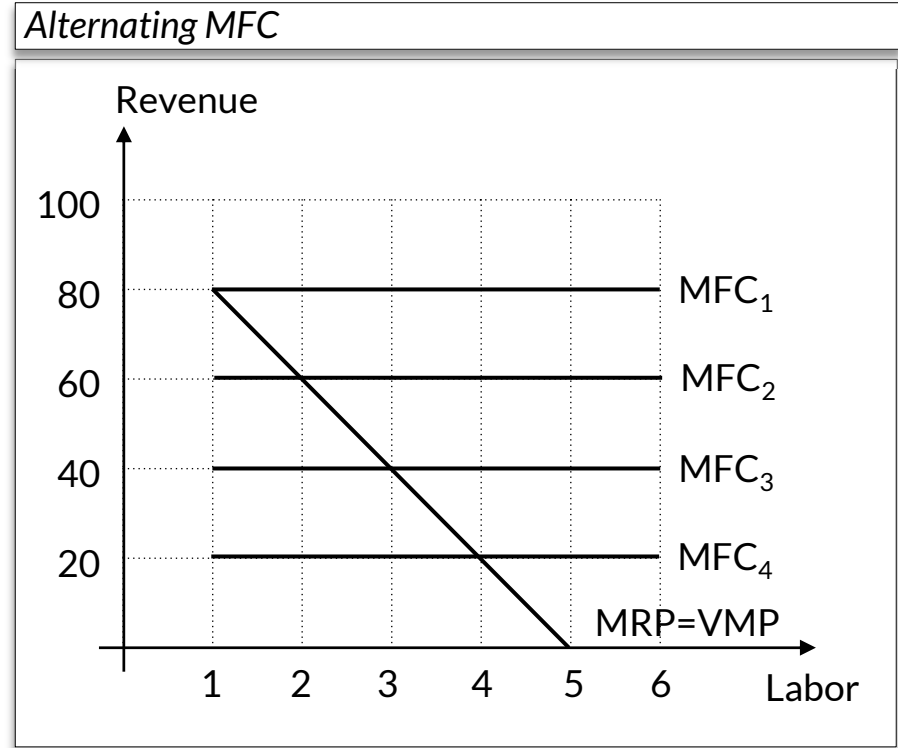
Since we assumed that factor market is perfectly competitive, both firms (demand) and households (supply) are price taker. Therefore, wage is consistent no matter how many units of labor a firm hires. We can then plot MFC as in the figure below.



Firms will maximize their profit when the marginal benefit and marginal cost are equal. For this case,

• $MRP = MFC$

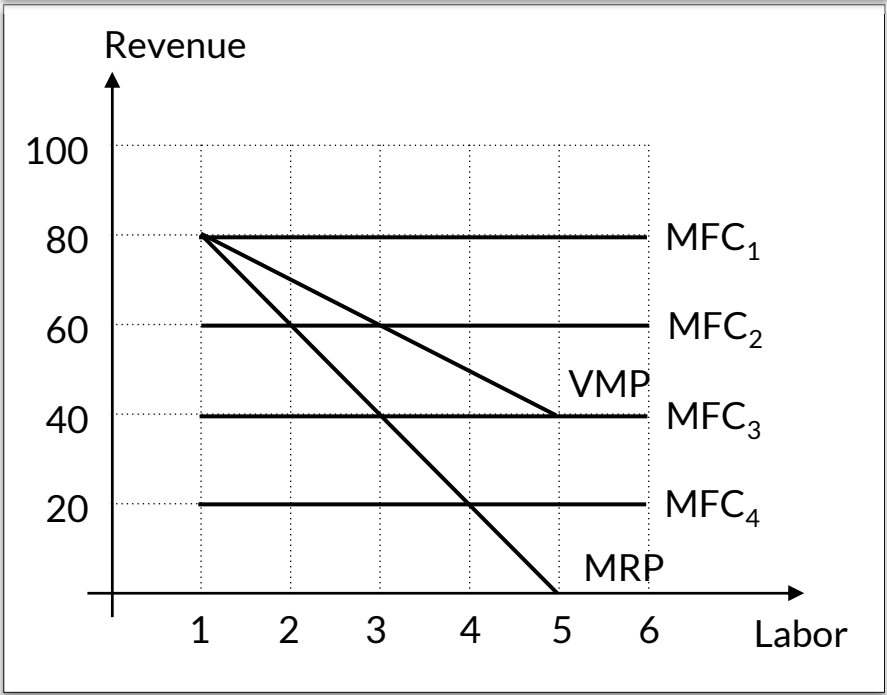
Assumed that product price remains constant, if we alternate wage, resulting in different level of MFC , each of the intersection represent firm's equilibrium.



Therefore, MRP is firm's demand for factor of production (or labor in this case).

(4) Additional detail on exploitation

Firm's equilibria (monopoly)



We can see clearly from this graph that when a product market is monopoly, there is a difference between value and cost of factor. It means that the further distance creates more exploitation. This seems pretty fit with real-world scenarios.

(1) Human and non-human factors

Supply for factors of production can be separately, roughly, analyzed by each factor. First of all, we define the supply as follows.

Definition 6.5

Demand for factors of production is quantity of factors of production supplied by households, at different level of price in a period of time.

Each factor has a different specification. We should discuss each of them briefly here. For non-human factors, they are land and capital.

- Land, as a factor of production, is a space occupied for a production. Land may not be very elastic in the short-run but can be more elastic in the long-run. When land becomes more and more occupied, the elasticity becomes closer to zero. Price for land is rent, therefore, supply and rent are easily understandable that they directly vary.
- Capital price is interest rate. Therefore, this is quite easy because in economics, the higher the interest rate, the higher the saving and also supply for capital.

Now for human factors, they are labor and entrepreneur. Most of the basic analyses leave entrepreneur out of the equation. Here we also assume their supply works the same way as labor supply.

To understand labor supply, we consider labor economics 101 with the assumptions here.

- People are rational, seeking to maximize their utility in everyday life.
- Choices are between to supply labor or to have some leisure.
- To supply labor is not the goal of receiving utility, but to gain compensation to further consume. We can then turn working hours to level of consumption, assumed that we have more budget to spend in product market as we work more. So the choices become between consumption and leisure.
- We are constrained by time.
- The tools used for the analysis are indifferent curves and budget line. Consumption and leisure are incompletely substitutable normal goods.

(2) Labor supply

As the ICs are mostly the same as when we analyze consumer, we will focus on the meaning of BL first.

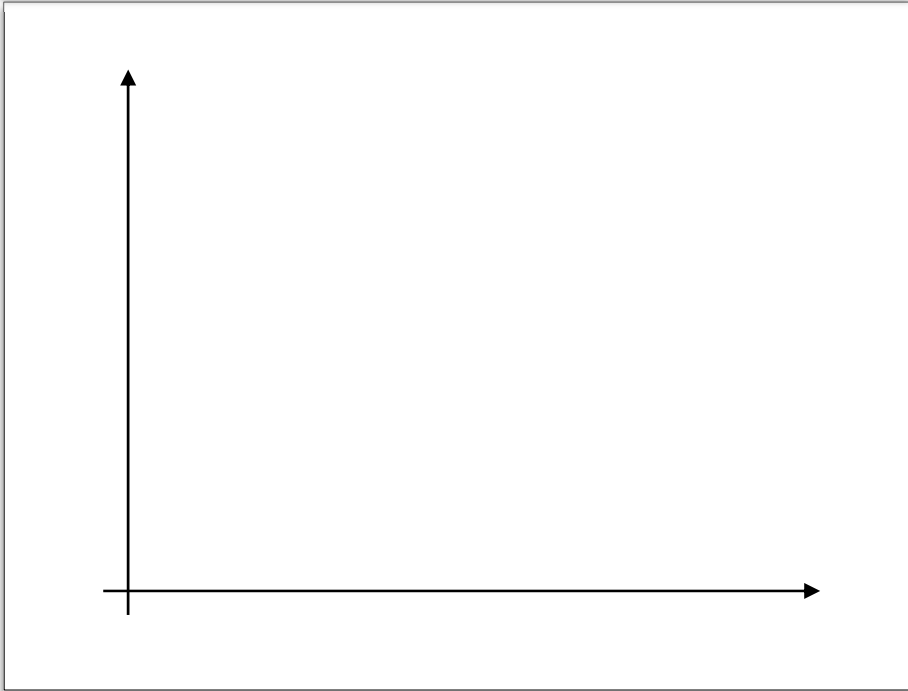
- What would happen to BL if wage increases? You can think of wage increase as higher opportunity cost of leisure.

Budget constraint for labor supply



We are trying to understand what happen to labor supply when wage increase. Labor economics suggests that there are 2 possible answer due to the different in size of income effect.

When labor supply increases with wage

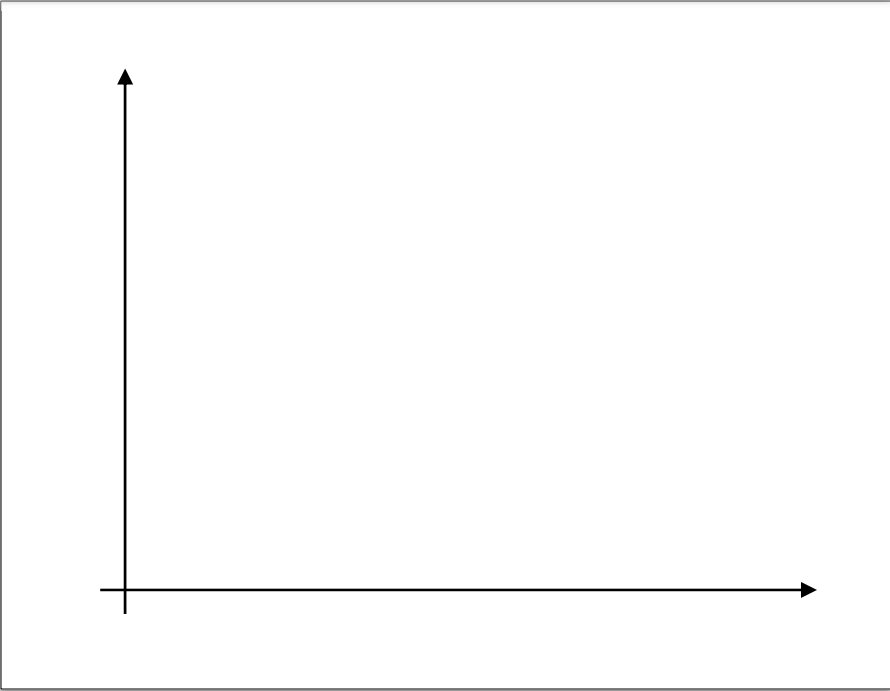


	c	L
SE		
IE		
PE		

(2) Labor supply

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When labor supply decreases with wage increase.

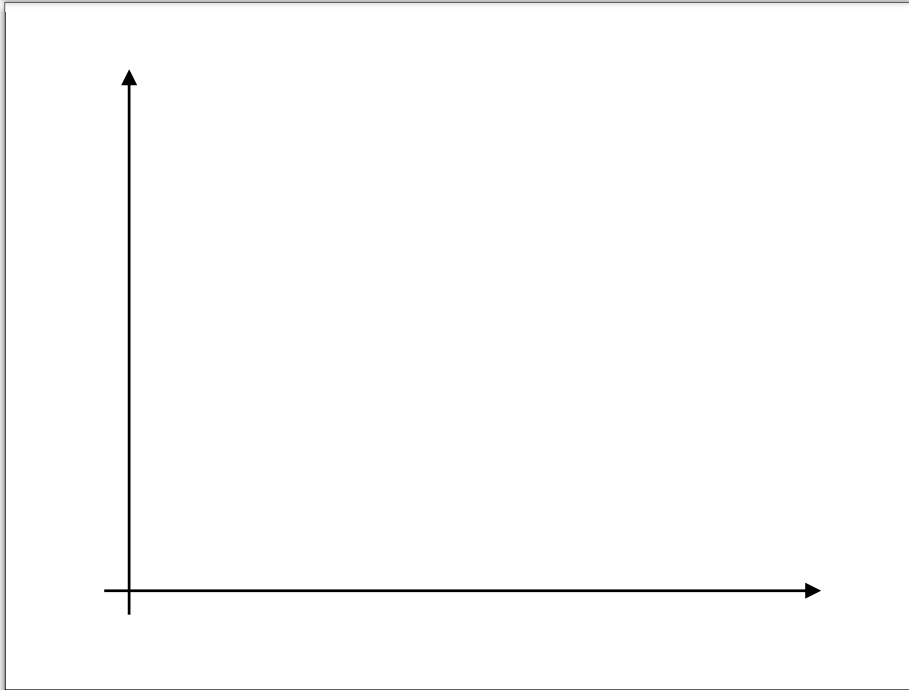


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Two possible suggested outcome are then combined into one labor supply curve due to the difference of income effect in different level of leisure.

Backward-bending curved labor supply

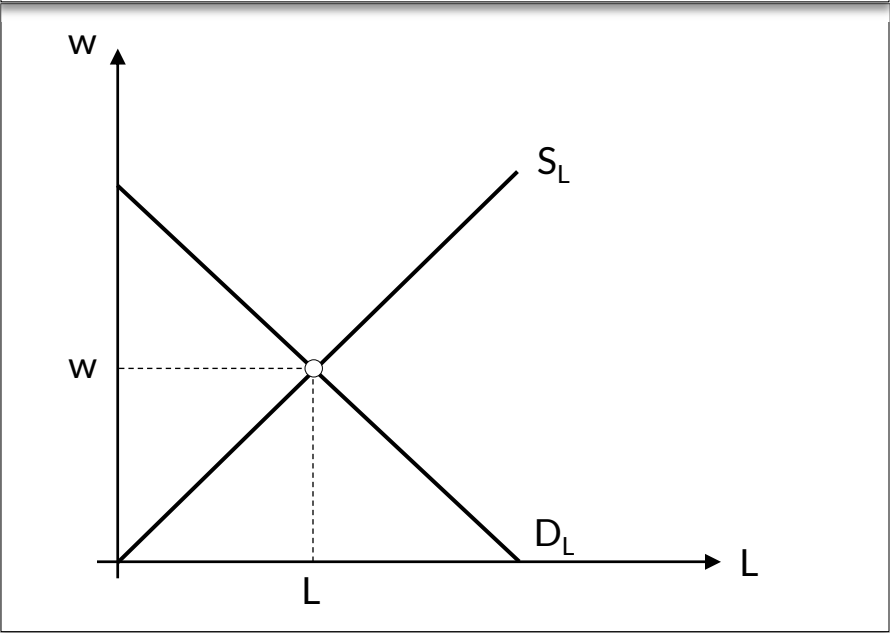


Human factors are likely to be more elastic in the long-run as well. For example, if data scientist becomes more demanded nowadays, it takes a while to supply labor in this market since the adjustment needed is education.

(1) **Equilibrium**

Demand and supply for labor are covered. Now let's take them both into the same graph, with an exception that we only consider before the supply curve bends.

Equilibrium in labor market

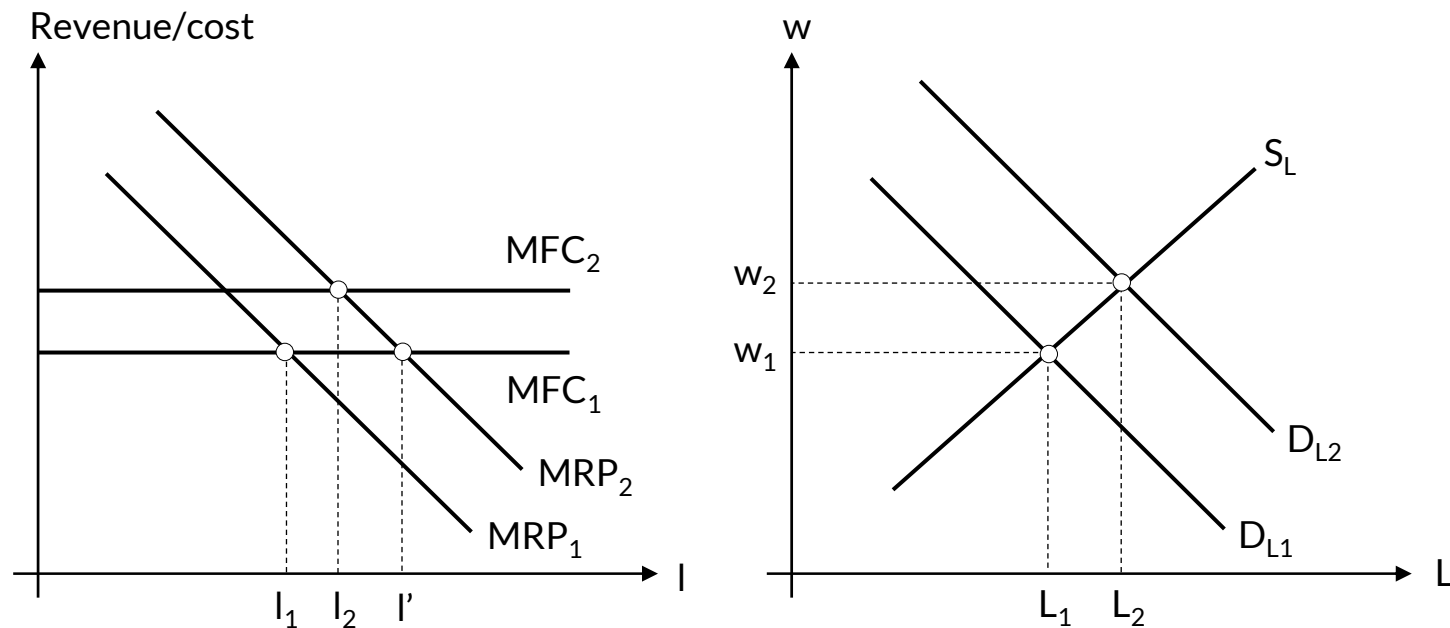


The equilibrium in labor market is determined by demand and supply for labor. However, since the demand is derived from product market, when product price goes up or down, price change also affects equilibrium in labor market. On the other hand, if there is any external factor affecting labor supply, it also affects price in product market. So we are studying two cases which are

- Higher demand in product market.
- Rising labor supply.

(2) Shifting equilibrium

Effect from product market

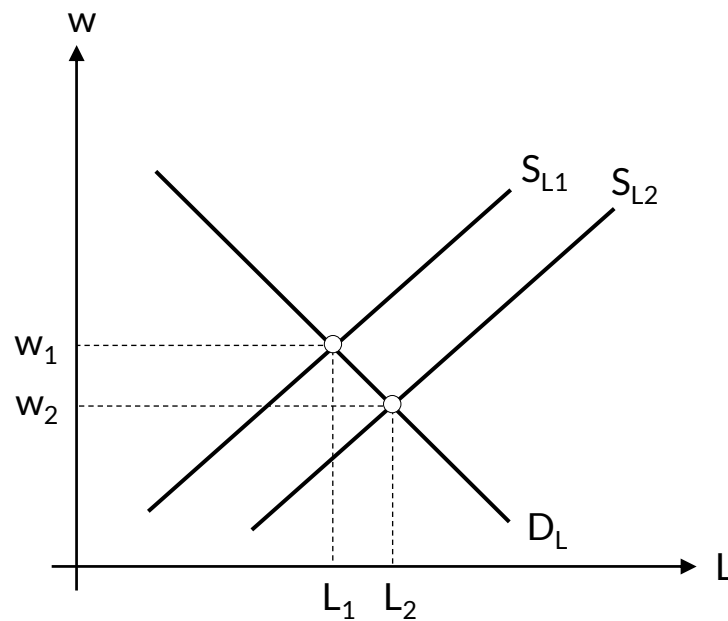
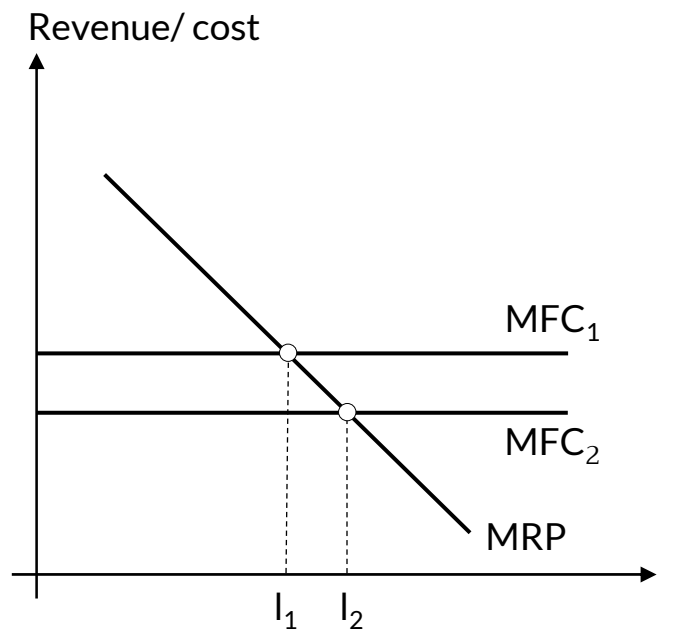


Let I be number of labor that a firm hires while L be total labor in an industry.

- Assumed price is driven upward by an external factor in product market, MRP shifts from MRP_1 to MRP_2 .
- Every firm demands more labor from I_1 to I' , driving total labor demand in this industry from D_{L1} to D_{L2} .
- Rising demand for labor causes wage increase from w_1 to w_2 , leading to an increase in MFC (from MFC_1 to MFC_2)

(2) Shifting equilibrium

Effect from factor market



- Assumed labor supply increases i.e. more people join labor force, labor supply shifts from S_{L1} to S_{L2} .
- Wage drops from w_1 to w_2 .
- MFC drops from MFC_1 to MFC_2 , labors are absorbed into an industry.

Market Failures

Part 7

EE211
Principles of Microeconomics
Revision Aug 2020

Problem statement and aims

At least 4 types of market failures have been theorized and well-received. Imagine that if we human only rely on market as a resource allocation tool, market alone cannot sort out some specific types of good or service. Oftentimes, price cannot act as a signal that represents true cost or benefit in our societies.

Four types of market failures consist of

- (1) **Market power:** This is already discussed in the monopoly section.
- (2) **Externalities:** Many economic activities generate external effects. If they are not accounted for both cost and benefit, market price cannot signal the true cost and benefit which leads to inefficient price and quantity.
- (3) **Public goods:** Some goods and services cannot be allocated through pure market because they will not generate any profit due to their attributes.
- (4) **Asymmetric information:** Information in the real world are limited for all agents. This may lead to inefficiency price set up and negotiation.

Therefore, the aims for this chapter are,

- Getting to know the basic concept market failures.
- Understand how it affects parties in the market system.
- Learn what and how our current policies have handled with the problems and what problems still persist in our economy today. Moreover, is there any problem that market failures do not cover.
- Further reading can be found in Pindyck and Rubinfeld (2018) Part 2, Chapter 3-4.

(1) Concept

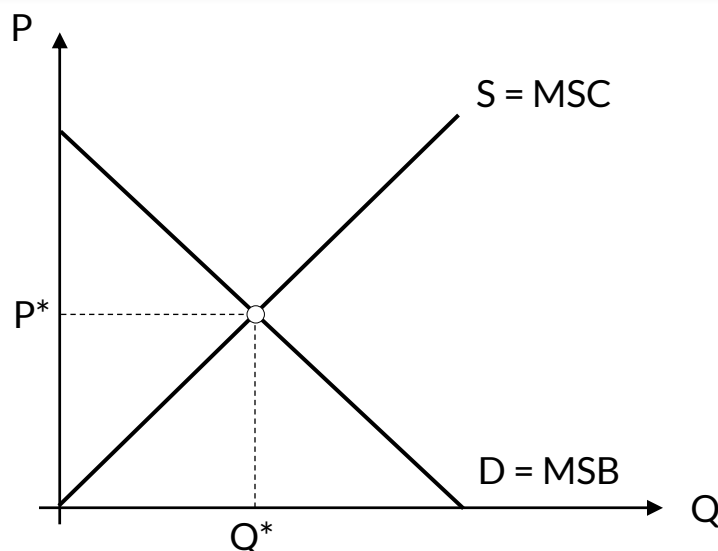
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Definition 7.1

Externality is the cost or benefit that affects a party who did not choose to incur that cost or benefit. Externalities often occur when a product or service's price equilibrium cannot reflect the true costs and benefits of that product or service.

If a market is perfectly competitive, and there is no external effect, demand and supply can represent **marginal social benefit (MSB)** and **marginal social cost (MSC)** respectively. Below is the simple demand-supply showing marginal social benefit and cost.

Social benefit and cost



$D = MSB$

Demand for any good or service can represent marginal social benefit. MSB is decreasing to quantity due to the law of diminishing marginal utility.

$S = MSC$

Supply for any good or service can represent marginal social cost. MSC is increasing to quantity due to the law of diminishing marginal product, raising marginal cost of production in the short run.

There are two types of externalities:

- (1) **Negative externalities:** a negative effect or cost incurred to a third-party irrelevant to a trade. The cost can be generated through either production or consumption process.
- (2) **Positive externalities:** a “fringe” benefit incurred to a third-party, again irrelevant to a trade. The benefit can be generated through either production or consumption process.

(2) Negative externalities

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If there is external cost, it means that it is not taken into account for the private. We can then separate

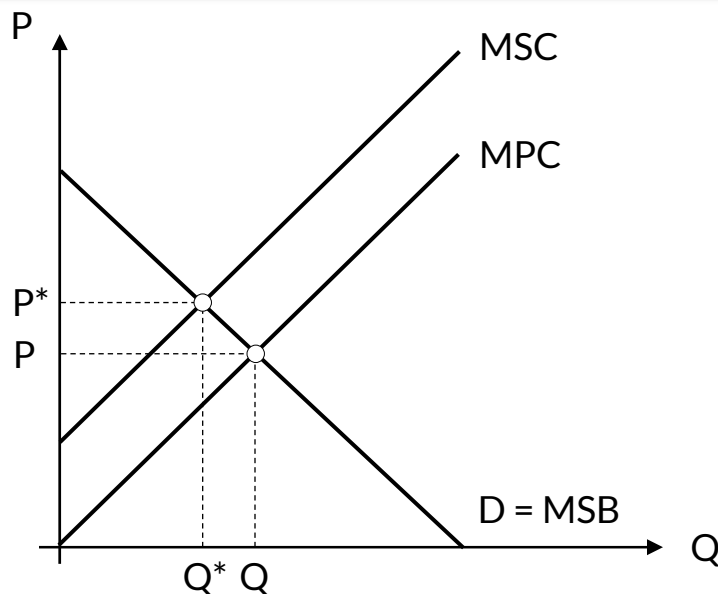
- $\text{social cost} = \text{private cost} + \text{externalities}$

Hence, negative externalities happen when the Marginal Private Cost (MPC) < Marginal Social Cost.

Assumed that the demand line still reflects true benefit in this case, we can analyze deadweight loss from this illustration below.

Examples of negative externalities

The “true cost”



(3) **Positive externalities**

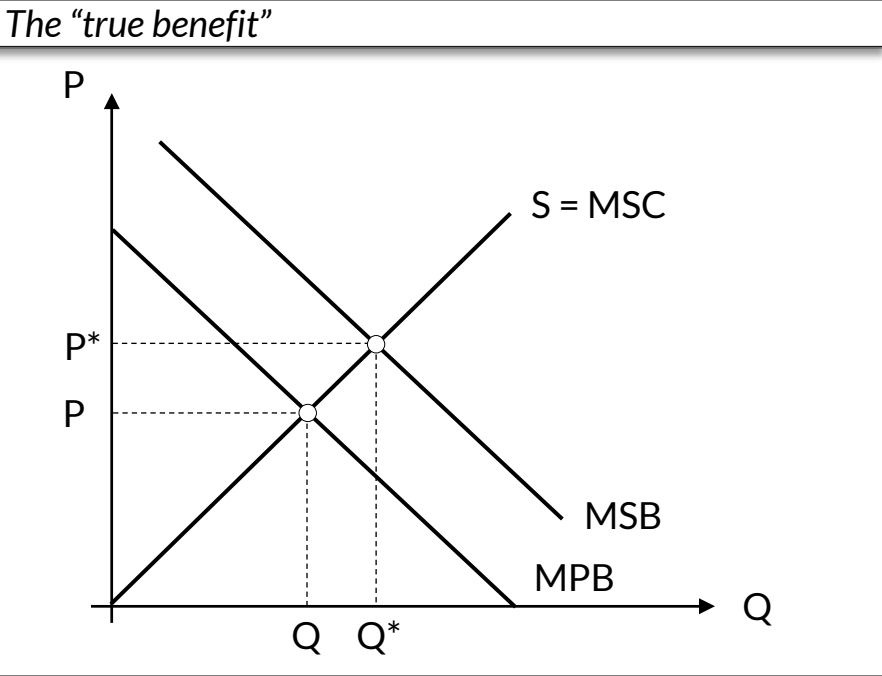
If there is external benefit, it means that it is not taken into account for the private as well. We can then separate

- $\text{social benefit} = \text{private benefit} + \text{externalities}$

Hence, positive externalities happen when the $\text{Marginal Private Benefit (MPB)} < \text{Marginal Social Benefit}$.

Assumed that the supply line still reflects true cost in this case, we can analyze deadweight loss from this illustration below.

Examples of positive externalities



(4) How to tackle externalities problem?



(1) Concept and problems

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Definition 7.2

Public goods is a product that is both **non-excludable** and **non-rivalrous**, that individuals cannot be excluded from use or could be enjoyed without paying for it, and where use by one individual does not reduce availability to others or the goods can be consumed simultaneously by more than one person

To depict a clearer picture, excludability and rivalry in consumption must ne defined.

Excludability is a characteristic of a good or service whether it can be excluded for those who pay for it.

Rivalry in consumption is also another characteristic that defines if a good or service can be simultaneously consumed by more than one person, or strictly speaking consumption does not have marginal cost.

If we divide types of goods by these characteristics, it can be sorted into 2 x 2 table on the right-hand side.

		Rivalry in consumption	
		YES	NO
Excludability	YES	<u>Private good</u> • Ice cream • Clothes • Congested toll	<u>Club good</u> • Netflix • Community service • Congested road
	NO	<u>Natural resource</u> • Fishery • Lumbering • Non-congested toll	<u>Public good</u> • National defense • Lighthouse • Non-congested road

Problems with public goods.

- No private firm would invest in any public good since they cannot return any profit.
- Consumers can enjoy utilizing public goods without paying a price, which we call them as ‘Free Rider’ problem.

(2) How to tackle public goods problem?



(1) Concept and problems

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Definition 7.3

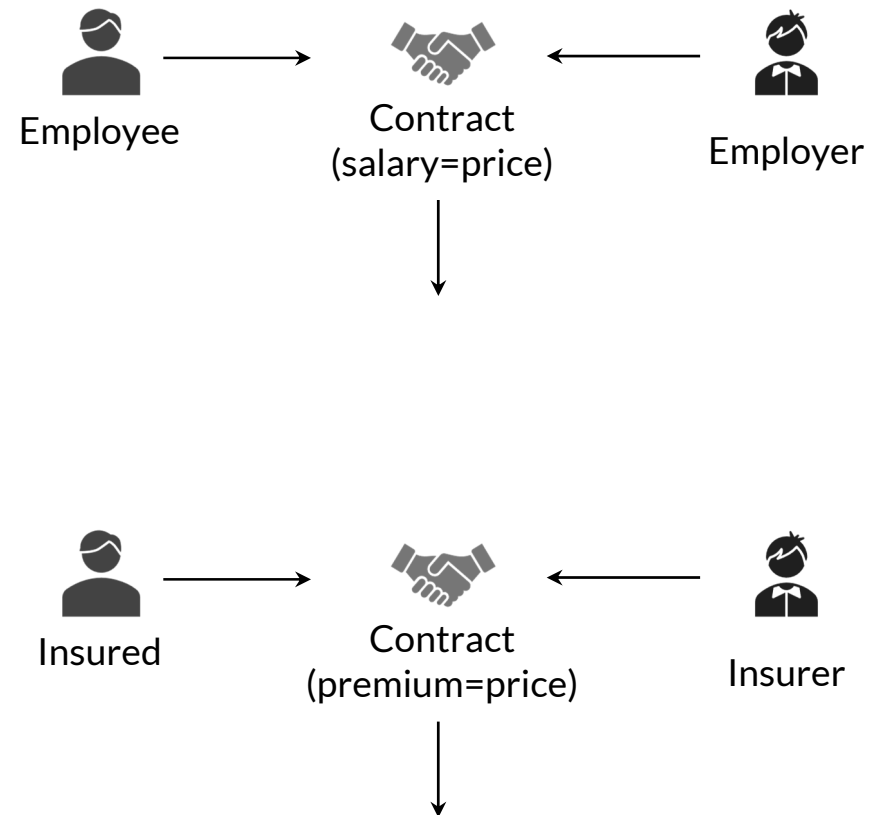
Asymmetric information deals with a situation when making decisions in transactions where one party has more or better information than the other. This asymmetry creates an imbalance of power in a transaction.

Two basic problems arise with asymmetric information which are **moral hazard** and **adverse selection**.

(1) **Moral Hazard** occurs when someone increases their exposure to risk when insured, especially when a person takes more risks because someone else bears the cost of those risks. Furthermore, it can be a situation when behavior changes after a contract is signed since another party cannot keep monitoring.

Examples of moral hazard are portrayed on the right-hand side.

Moral Hazard problem



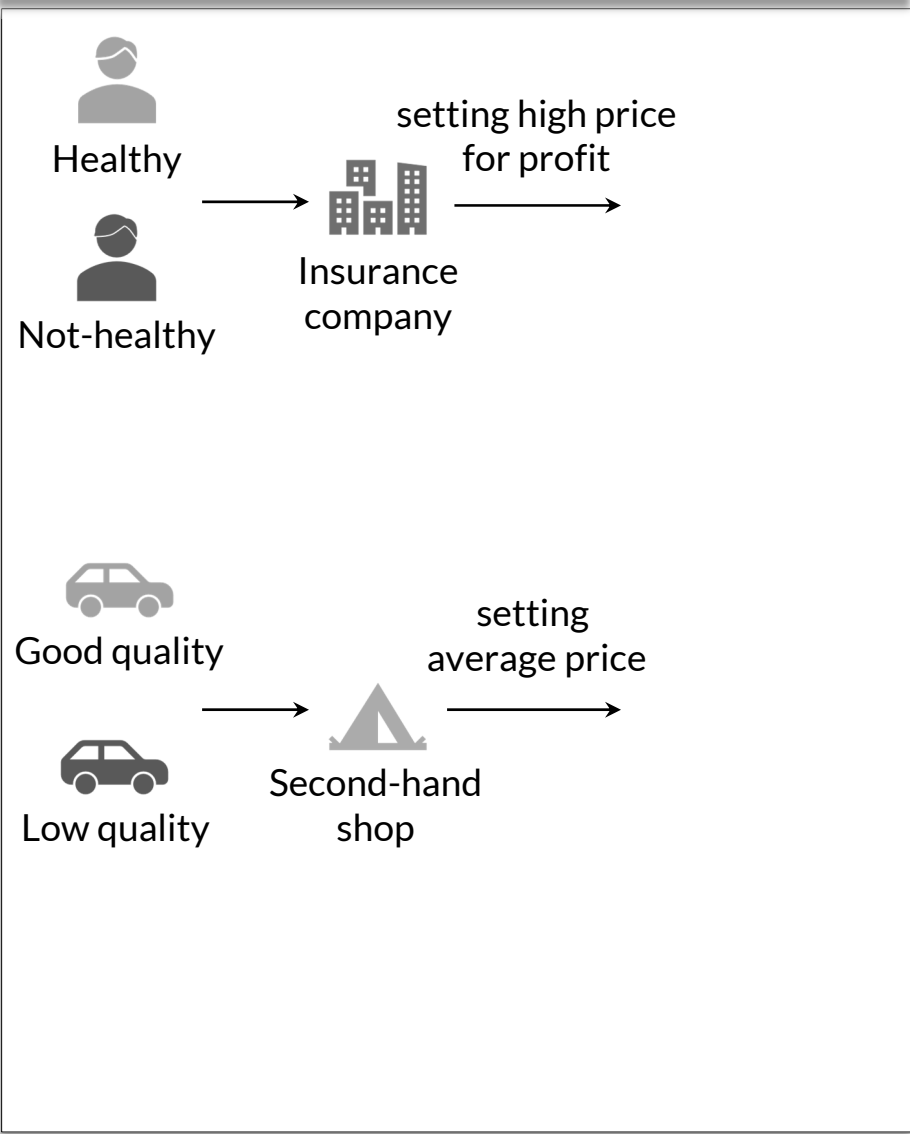
(1) Concept and problems

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(2) **Adverse Selection** is when traders with better private information about the quality of a product selectively participate in trades which benefit them the most, at the expense of the other trader.

Examples of adverse selection are portrayed on the right-hand side.

Adverse Selection problem



(2) How to tackle asymmetric information problem?



Concluding remarks

- Getting to know the basic concept market failures.
- Understand how it affects parties in the market system.
- Learn what and how our current policies have handled with the problems and what problems still persist in our economy today. Moreover, is there any problem that market failures do not cover.
- Further reading can be found in Pindyck and Rubinfeld (2018) Part 2, Chapter 3-4.