WK 8: the perfectly competitive market– CHP XI & XII

CHP. XI: INTRODUCTION TO MARKETS

Different market structures:

- Perfectly competitive markets
  - These markets have many buyers and sellers, low barriers to entry and an identical product
  - Consequently, firms do not have the market power to set prices
- Monopoly markets
  - A market with one seller and high barriers to entry and the power to choose its price
- Monopolistically-competitive markets
  - There are many firms selling slightly differentiated products
  - These sellers have scope to set their own prices, but there are low barriers to entry into these markets
- Oligopoly markets
  - These markets are characterized by only having a few firms
  - Consequently, the strategic interaction between these firms is critical to the outcome in these markets, dictated by the actions of other firms in the market

CHP. XII: PERFECT COMPETITION

12.2: CHARACTERISTICS of perfect competition

Perfectly competitive markets have the following characteristics:

1. Many buyers and sellers - all buyers and sellers are a very small part of the total market
2. Homogeneous products- all good and services are identical so consumers are indifferent as to whom they purchase from. We assume that all firms have access to the same technology
3. Price taker- given they are trading a homogenous product and given the number of buyers/sellers, no individual has sufficient market power to influence market prices
4. Free entry and exit- firms can freely (that is, costlessly) enter and exit the market in the long run, that is, there are no barriers to entry in the long run

12.3: SUPPLY in the short run

- At least one of a firm's factors of production is fixed in the short run
  - Firm has a fixed cost of production that will be incurred regardless of its output- the fixed cost is a sunk cost
  - Thus, in deciding the level of output to produce in the short run, a firm will ignore its fixed costs

Firm supply in the short-run: the shutdown decision

- If a firm produces output, its supply curve is given by its marginal cost curve
- However, if a firm chooses not to produce output in the short run, we say that the firm shuts down
- A firm will shut down if the revenue from selling that output cannot cover the cost of producing it
- In the short run, the firm should only take into account its variable costs, as its fixed costs are sunk. This means that the firm will have to pay for its fixed inputs regardless of whether or not it produces any output, so it should ignore those costs when deciding whether or not to produce any output
- Hence, we can derive the shut-down condition that a firm will shut down in the short run if total revenue is less than variable cost

$$TR < VC$$

- We can also divide both sides of this equation by the level of output (q) to yield the following condition:

$$\frac{TR}{q} < \frac{VC}{q} \rightarrow p < AVC$$

- If price falls below AVC, a firm will shut down
- If a firm does produce a positive output, it chooses the level of output in accordance with its supply curve – that is, its MC curve
- Remember that the MC curve intersects the AVC curve at its minimum. Thus, we can rewrite the shut-down rule as:

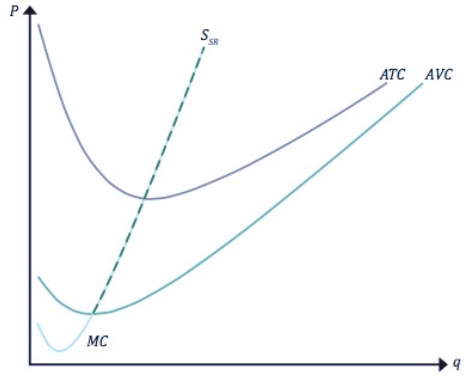
$$P < AVC_{MIN}$$

- On the other hand, a firm will supply a positive quantity provided:

$$P \geq AVC_{MIN}$$

- Hence a firm's short-run supply curve is traced out by the part of its MC curve that lies above AVC_{MIN}

FIGURE 12.1; the short-run supply curve of a firm is traced out by the part of the MC curve that lies above AVC. In this diagram, it is denoted by the dashed line



Market supply in the short run

- In the short run, there is no entry or exit in the competitive market
- A firm is prevented from exiting the market by its fixed costs; if a firm in the market wishes not to produce anything, it shuts down (but does not exit)
- Additional firms are prevented from entering in the short run because they do not have the necessary fixed inputs to establish operations
- Thus, the number of firms in the market is fixed in the short run
- We can derive the short-run market supply by horizontal summation of the individual supply curves (the MC curves above AVC_{MIN})

Profits and losses in the short run

- In a competitive market, it is possible for firms to make profits or incur losses in the short run
- Profit is total revenue minus total cost
- Thus, if a firm is making a positive profit, its total revenue is greater than its total cost

$$\pi > 0 \rightarrow TR > TC$$

- Diving both sides of this equation by q gives:

$$\frac{TR}{q} > \frac{TC}{q} \rightarrow p > ATC$$

- Thus, if a firm is making profits, the price is greater than average total cost
- Conversely, if a firm is making a loss ($\pi < 0$), total revenue must be less than total costs
  In other words, price is less than average total costs $p < ATC$

- We can identity in a diagram the area tat represents the firm's profit/loss

  In the figures below, market price is given by p^* as the firm is a price taker, this price is determined in the market by the forces of supply and demand (left hand side of image) and then the individual firms take that price as given
  Quantity supplied by the firm is q^*, as determined by the firm's supply curve (MC curve); at that quantity, the firm's average total cost is ATC^*
  The difference between p^* and ATC^*, multiplied by the quantity supplied (q^*), represents the firm's profit or less
- A firm will be willing to continue to sell in the short run when making a loss provided $P > AVC_{MIN}$.
  The firm is better off than shutting down because the extra revenue (in excess of its variable costs) help it pay for some of its fixed costs

FIGURE 12.2; here the price exceeds average total cost, so the shaded area denotes the firm's profits

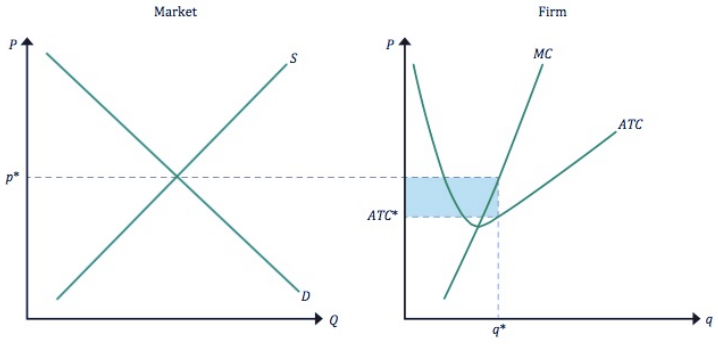
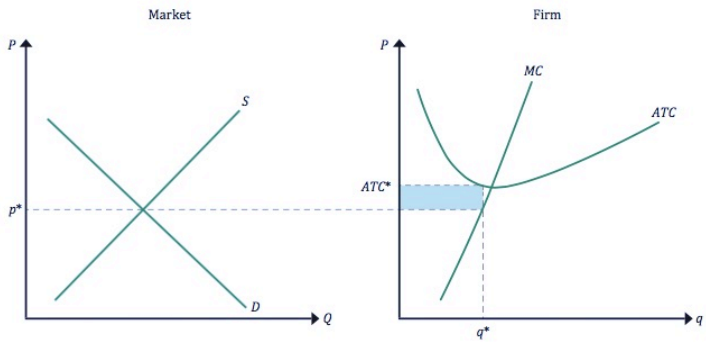


FIGURE 12.3; here the price is less than average total cost, so the shaded area denotes the firm's loss



12.4: SUPPLY in the long run

- In the long run, there is free entry and exit in the market. This is because all inputs are variable, thus a firm wishing to exist is not hindered by having to pay fixed costs and a firm wishing to enter has the time to acquire all the necessary inputs to start operations.
  This means that all costs are opportunity costs
- Hence, a firm deciding its level of output in the long run will take into account the costs of all inputs
- A firm will enter or exit the market depending on its (anticipated) level of profit or loss in the market. The market will reach its long run equilibrium when the number of firms in the market stabilises, that is, there is no longer any entry into or exit from the market
  This occurs when firms are making zero profits

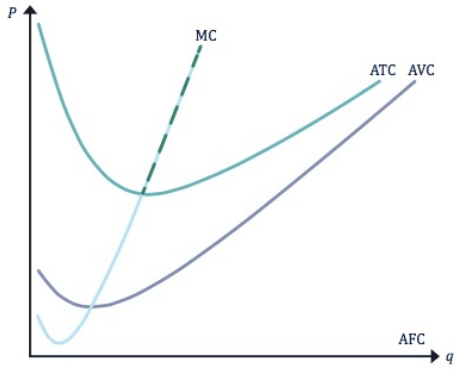
Firm supply: the exit/entry decision

- In the long run, there is free exit from a competitive market. Thus, if a firm chooses not to produce output in the long run, it can exit the market and incur zero production costs
- Hence, a firm will choose to exit the market if its total revenue is less than its total costs, or, if its profits are less than zero
  This occurs when $p < ATC$
  Because the MC curve interests the ATC curve at its minimum, we can write the exit condition as:
  $$p < ATC_{MIN}$$

- In the long run, there is also free entry into competitive markets. This captures the fact that firms wishing to enter the market have enough time to obtain the necessary fixed inputs in order to establish operations in the market
- A firm will choose to enter the market if it can make a profit by doing so ($\pi > 0$).
  This occurs when $p > ATC$
  Noting that the MC curve intersects the ATC curve at its minimum, we can write the entry condition as:
  $$p > ATC_{MIN}$$

- A firm's long-run supply curve is traced out by the part of the MC curve that lies above ATC_{MIN}

FIGURE 12.4; the long run supply curve of a firm is traced out by the part of the MC curve that lies above ATC. In this diagram, it is denoted by the dashed line



One thing to note is that because all factors are variable in the long run, the firm will choose the most appropriate mix of inputs for its level of output. This may entail a different mix of inputs for various levels of output. This means that the firm's long-run marginal cost curve may not be the same as its short-run marginal cost curve. However for analytical simplicity, we tend to assume the two curves are identical

WK 9: monopoly– CHP XIII

CHP. XIII: MONOPOLY

13.1: INTRODUCTION

- These are markets with only one seller
- The market power of a monopolist allows it to charge higher prices to increase its profits
- Monopolist might use price discrimination to further increase its profits
- Natural monopoly – less costly for the whole market to be serviced by one firm, rather than by two or more

13.2: CHARACTERISTICS of a monopoly

1. One seller and many buyers – there is a single producer of all output in the market
2. Price maker – because the monopolist is the only firm in the market, it has the market power to determine the price in the market
3. Barriers to entry – firms that might like to enter the market are prevented form doing so by barriers to entry
   Barriers may exist due to:
   The monopolist has access to a natural resource/technology that is not available to other firms
   The monopolist holds a patent or a copyright that prevents other firms from selling the same product
   The government bans entry by other potential sellers
   The monopolist has a lower cost of production that allows them to prevent other firms from entering

Sources of monopoly

1. Access to a critical resource/input
   E.g. a recipe for a dish – Coca Cola
2. Patents
   It is costly to research how to make a product
   A patent allows firms to be a monopolist and set P=MC to cover research costs
   These are only for a set period of time and are given as the Gov. wants to encourage research
3. Economies of scales/natural monopoly
   $TC = FC + cQ$
   ATC may be lower with one firm as opposed to two if they have huge fixed costs but small marginal costs
   E.g. cable TV, utilities
4. Government licenses
   E.g. taxis, bars, casinos, the East India Company
5. Anti-competitive behaviour
   Engages in illegal practices to drive other firms out of the industry
   E.g. case against Microsoft- selling exclusive contracts to other firms so Microsoft is only software that works
6. Network externality
   Where my benefit on using a product depends on whether others use it or not
   E.g. Facebook

13.3: THE single-price monopolist

- This is a monopolist who charges the same price to all of its consumers
- The monopolist is the sole producer, so it faces all the demand in the market
  Thus, it faces the downward-sloping market demand curve
  This is because if it changes its price, it will not loose much demand (as no substitutes)
- However, the monopolist does not itself have a supply curve
  The supply curve applies only to competitive firms, as it is derived assuming a firm is a price taker
- Thus, we can't apply our demand-supply framework to determine the price that a monopolist will charge
  Instead, we will determine this by considering its profit-maximising choice
  To do this, we need to understand the monopolist's marginal revenue curve

Marginal revenue

- Marginal revenue = additional revenue from selling one extra unit of good
- Because the monopolist faces a downward-sloping demand curve, if it increases output by one unit the price will fall by some amount
- Thus, for the monopolist there are two effects at play:
  (i) The increase in output increases total revenue
  (ii) The decrease in price decreases total revenue

- To calculate marginal revenue (MR), we differentiate total revenue equation (TR) with respect to output (Q). This tells us how total revenue changes as we increase output by one unit:

$$MR = \frac{dTR}{dq}$$

- To illustrate this, consider a demand curve with an equation $P = a - bQ$, where P is the price, Q is the quantity demanded, and a and b are positive parameters.
  We can write the total revenue equation as follows:

$$TR = P \times Q = (a - bQ) \times Q = aQ - bQ^2$$

- Now, we differentiate the right hand side to obtain marginal revenue:

$$MR = \frac{dTR}{dq} = a - 2bQ$$

Two things to note about the MR equation:

1. It has the same vertical intercept as the demand curve; they both cross the P-axis at a
2. The MR curve has twice the slope of the demand curve; the MR curve has a slope of $-2b$ whereas the demand curve has a slope of $-b$
   As a result, the MR curve will intersect the Q-axis at exactly half the quantity of the demand curve intersection; the MR curve cuts the Q-axis at $\frac{a}{2b}$ and the demand curve cuts the Q-axis at $\frac{a}{b}$.

- The equation $P = a - bQ$ could represent any linear demand curve
- Thus, for any linear demand curve, we can obtain he equation of the MR curve by simply doubling the gradient of the demand curve equation

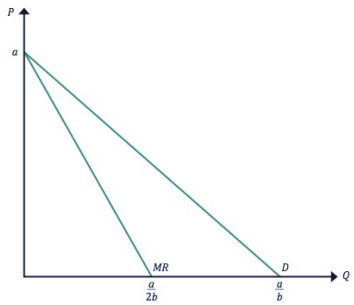
Example:
Suppose the demand curve is given by the equation $Q = 100 - 4P$

Rearrange so that P is the subject → $P = 25 - \frac{1}{4}Q$

Now, to obtain the MR equation, take the slope of the demand curve ($-\frac{1}{4}$), and double it to obtain:

$MR = 25 - \frac{1}{2}Q$

FIGURE 13.1; when the demand curve is linear, the marginal revenue curve has the same vertical intercept and twice the slope of the demand curve



Further: intuition for marginal revenue in terms of elasticity

$$\Delta TR = P'\Delta Q + Q.\Delta P$$
$$\textit{Where } \Delta Q = Q' - Q \textit{ and } \Delta P = P' - P$$

- $\Delta TR = (\Delta + P)\Delta Q + Q.\Delta P$
- $= \Delta P.\Delta Q + P.\Delta Q + Q\Delta P$
- $\frac{\Delta TR}{Q} = \frac{\Delta P \Delta Q}{\Delta Q} + \frac{P.\Delta Q}{\Delta Q} + \frac{Q\Delta P}{\Delta Q}$
- $\Delta P + P + \frac{Q\Delta P}{\Delta Q}$
- To find MR, let ΔP get very small: $\Delta P \to 0$
- $MR = P + Q\frac{dP}{dQ}$

$\frac{dP}{dQ}$ is the slope of the Dd curve, which is negative, so MR must be less than price

Institution- the monopolist is constrained by the demand curve, so to sell the next unit, it must lower their price

ECON 1001 SUMMARY

Key economic concepts

- Scarcity is the limited availability of resources, meaning that not all wants can be met
- Opportunity costs include explicit (direct payment) or implicit (forgone opportunities) costs, but not sunk costs
  - Calculating OC: $\frac{other\ item}{item\ of\ OC\ you\ are\ calculating}$

Marginal analysis

Measured by weighing the marginal benefit (extra benefit derived from buying an extra unit) against the marginal cost (additional cost of buying that extra unit)

Ceteris paribus → where economists hold other factors constant to examine the impact of one change at a time

Trade & the PPF

Trade is beneficial to individuals because it allows them to specialise in industries where they have the comparative advantage, and trade with others for things that would cost them more to produce personally

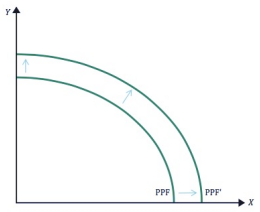
- Trade will occur when $v_s \leq p \leq v_b$, and the gains from trade are $v_b - v_s$
- The gains from trade arise due to
  - Gains from exchange → reallocating goods to those who value them most
  - Gains from specialisation → allowing parties to specialise in producing the good in which they have the lowest opportunity cost

The PPF

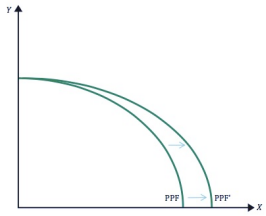
Graphs the output that an individual/country can produce for a particular set of resources

- Any point inside or on the PPF is obtainable
- Any point on the PPF is efficient
- Any point inside the PPF is inefficient
- Any point outside the PPF is not feasible

- If either the amount of resources available or the state of technology changes, so can the shape of the PPF

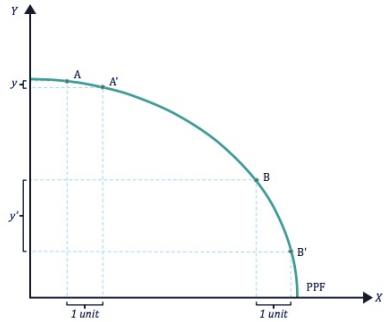


With a shock that boosts production of both goods, PPF shifts outwards from origin along both axes



With a shock that boosts the production of X only, the PPF will shift outwards from origin along the X-axis only

- The slope of the PPF measures the opportunity cost of producing an extra unit of a good (in terms of the other), for a particular point on the frontier



- As Australia is on the PPF, it is fully utilising its resources – thus, in order to increase the production of X, it is necessary to give up some Y
- The amount of Y that must be forgone depends upon the slope of the PPF
  - E.g. suppose Aus would like to move from A to A', increasing the production of X by one unit
    → To do so, it is necessary to give up y units of Y
    → However, if Aus were moving from B to B', it would have to give up y' units of Y
    Thus, the slope of the PPF shows the OC in terms of Y forgone of getting more X

Absolute advantage and comparative advantage

- Party A has an absolute advantage over Party B if A can produce a greater number of a good than B
- Party A has a comparative advantage over Party B if A's opportunity cost of producing a good is lower than B
- One party can have the absolute advantage in both goods, but cannot have a comparative advantage in both

Specialisation

- Specialisation in when parties specialise in producing the good that they have a CA in- this increases total output
- Through trade and specialisation, parties can reach points outside their PPF

Demand → consumers are price takers – they cannot affect the price market

Benefit & willingness to pay

- We can measure the benefit a consumer will get out of a G/S by their willingness to pay (WTP)
  - Total benefit (TB) measures the benefit one gets from consuming the total number of units of G/S
  - Marginal benefit (MB) measures the change in total benefit one derives from consuming one extra unit

  $MB = \frac{\Delta TB}{\Delta q} = \frac{dTB}{dq}$ → *marginal benefit equation where q = number of units consumed*
- 'Consumer surplus' is similar to profit- this is essentially the P-WTP or P- MB
- Diminishing marginal benefit → the phenomena in which the MB declines with each extra unit consumed
  - Due to this, the marginal benefit curve will usually be a downward sloping line

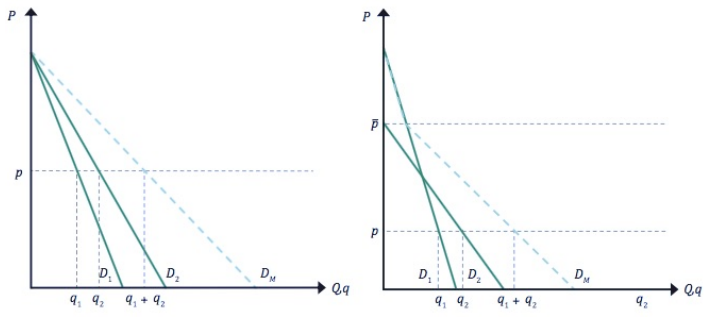
Individual demand

- A consumer's marginal benefit curve is used to derive his individual demand curve (as D=MB)
- Individual demand- quantity of a G/S that a consumer is willing and able to buy at a certain price
- Individual demand curve traces out all combinations of
  (a) Market price
  (b) Individual demand at that price
- A consumer will purchase units o until the point where $P = MB$ → thus, ID curve will slope ↘ like an MB curve
- A demand curve represents how much a consumer is wiling and able to pay at different prices
  - The higher the market price, the fewer units a consumer buys
  - The lower the price, the more they buy
    → This negative relationship between price and quantity demanded is called the law of demand
- A movement along the demand curve is known as a change in the quantity demanded, affected by changes in p/q
- A movement of the demand curve itself is called a change in demand, affected by factors held constant (not p/q)
  - Shifts to the right represent an increase in demand, perhaps due to higher income
  - Shifts to the left represent a decrease in demand, perhaps due to lower income
- Furthermore, if a change in the price in another good x occurs, a change in the demand of y will occur – this is if the goods are substitutes i.e. cheaper coffee (x) will lead to less demand for tea (y)
- x and y can also be complements– an increase of price of y will decrease demand of x, e.g. increase in price of sugar (y) will decrease demand of coffee (x)
- Inferior goods → goods where quantity demanded decreases when consumer income rises e.g. public transport
- Normal goods → goods where quantity demand increases when their income increases

Market demand → aggregate demand, found by the sum of individual demand

- The market demand curve (MDC) traces out combinations of
  (a) Market price
  (b) Quantities that all consumers in a market are together willing and able to bay at that price

The MDC can be derived by adding together the quantity demanded by each individual consumer at each price – graphically, it can be derived by horizontally adding the individual demand/MB curves along the q-axis



1st graph- both individual demand curves have the same P-intercept. Then, for every price p, the quantity demanded by the market will be the sum of individual consumer demand (q1 + q2)

2nd graph- curves have different P intercepts. Above the price $\bar{p}$, the quantity demanded by individual 2 will be zero; thus, in this range, the curve follows the individual demand curve for consumer 1

Below the price $\bar{p}$, the quantity demanded by both consumers is positive; in this range, the quantity demanded by the market will be the sum of individual consumer demand (q1 + q2)

It can also be derived analytically

1a.

$$P = 3 - 0.25q_a \rightarrow$$

2a.

$$0.25q_a = 3 - P \rightarrow q_a = \frac{3}{0.25} - \frac{1}{0.25}P$$

$$\rightarrow q_a = 12 - 4P$$

1b.

$$P = 3 - 0.5q_b \rightarrow$$

2b.

$$0.5q_b = 3 - P \rightarrow q_b = \frac{3}{0.5} - \frac{1}{0.5}P$$

$$\rightarrow q_b = 6 - 2P$$

$$Q = q_a + q_b$$

Thus: $q_a + q_b = 18 - 6P$

= Aggregate demand

Thus $q_a(P)$ and $q_b(P)$

So the aggregate demand is: $Q = 18 - 6P$

Production and costs

The short run and long run

- Short run- at least one of the factors of production is fixed e.g. the size of a factory. This cannot be changed regardless of how much output is produced
- Long run- all factors of production are variable (not fixed.) Firm is free to decide whether to renew lease 4 factory

Production

Production function- shows the relationship btn quantity of inputs used and the (maximum) quantity of output produced

Marginal product

Marginal product (MP) is the change in output when one more input is used. It is the slope of the production function. We can use differentiation to find the marginal product of an input

Diminishing marginal product: a short-run concept

- If the MP becomes progressively smaller, this is called diminishing marginal product
- Diminishing MP is very common. In the short run there is a fixed input which creates a capacity constraint
- We can use differentiation to work out how *MP* changes as we increase the quantity of an input
- Take the function $q = f(KL)$, where K = capital and L = labour
  - In the short run, this will be written as $q = f(\overline{K}L)$, as $\overline{K}$ indicates that the stock of capital is constant
  - As a result, we can write the function as simply $q = f(L)$
- The marginal product will tell us the rate of change of production. MP is a derivative of the function $df(L)$
- To prove that the MP is diminishing, the derivative of the MP must be negative

  Use this equation: $q = f(\overline{K}L) = \sqrt{\overline{K}L} = \sqrt{\overline{K}}\sqrt{L} = \overline{K}^{\frac{1}{2}}L^{\frac{1}{2}}$
  - Step 1: calculate the MP. Remember to take only the derivative of L as K is constant

$$MP = \frac{df(L)}{d(L)} = \frac{d\overline{K}^{\frac{1}{2}}L^{\frac{1}{2}}}{dL} = \frac{1}{2}\overline{K}^{\frac{1}{2}}L^{-\frac{1}{2}}$$

  - Step 2: demonstrate that MP diminishes by taking the derivative of MP and showing that the sign is negative

$$MP' = \frac{d^2f(L)}{dL^2} = -\frac{1}{2} \times \frac{1}{2}\overline{K}^{\frac{1}{2}}L^{-\frac{1}{2}-1} = -\frac{1}{4}\overline{K}^{-\frac{1}{2}}L^{-\frac{3}{2}} < 0$$

Returns to scale: a long-run concept

- Returns to scale- how quantity of output changes when there is a proportional change in the quantity of all inputs
- Constant returns to scale- where output increases by the same proportional change
- Increasing returns to scale- where output increases by more than proportional increase in all inputs
- Decreasing returns to scale- where output increases by less than the proportional increase in all inputs