

# The Costs of Production

## Notes

### THE COSTS OF PRODUCTION

- ▶ When firms produce, they incur economic costs of production.
- ▶ Economic costs are the opportunity costs involved with using the factors of production to create a good or service
- ▶ Includes both explicit and implicit costs.

### EXPLICIT COSTS

- ▶ Include the opportunity cost of using resources - amount paid to acquire them.
- ▶ The opportunity cost of using resources = amount paid to acquire them.
- ▶ These payments could have been made to buy something else instead, which is now being sacrificed.

For example, if a firm hires a worker for \$1,000 a week then the opportunity cost to the firm is the cost of that worker's wage and the other things on which \$1,000 could have been spent.

- ▶ Also called "accounting costs" or "money costs" because they involve a direct payment of money.

### IMPLICIT COSTS

- ▶ Include opportunity costs of factors of production already owned by the firm.
- ▶ These are the earnings that a firm could have had if:
  - It had employed its F&P in another use; or,
  - It hired them out; or,
  - It sold them to another firm.

Example #1: the owner of a firm may be able to earn \$100,000 per year in their next best alternative job, as a tax accountant. This opportunity cost should be included in the firm's economic costs. Some would argue that it's the most important costs, since if it is not met, the entrepreneur would presumably close down the firm and become a tax accountant.

Example #2: A firm owns buildings that it uses to produce its goods. The buildings could be rented out to other firms for \$15,000 per month. The opportunity cost to the firm of using the buildings itself is the rent that is forgone and the things that could have been purchased with that money.

### ACCOUNTANTS VERSUS ECONOMISTS

- ▶ Accountants mostly use explicit costs in their calculations
- ▶ Economists count both implicit and explicit costs.
- ▶ Thus, accountants and economists would report different profits for some firm.

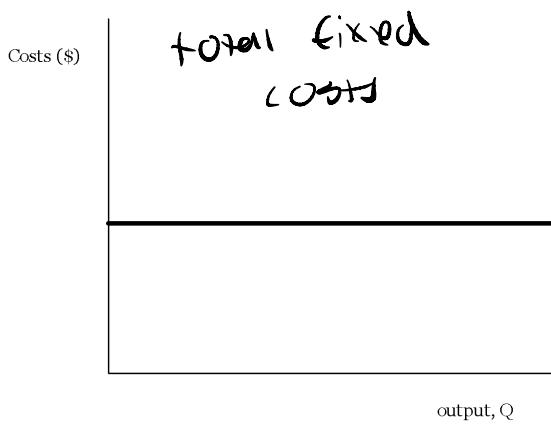
### SHORT-RUN COST THEORY

- ▶ Firms have many different costs when producing goods/services.
- ▶ We tend to separate costs in three separate groups:
  1. Total costs
  2. Average costs
  3. Marginal costs

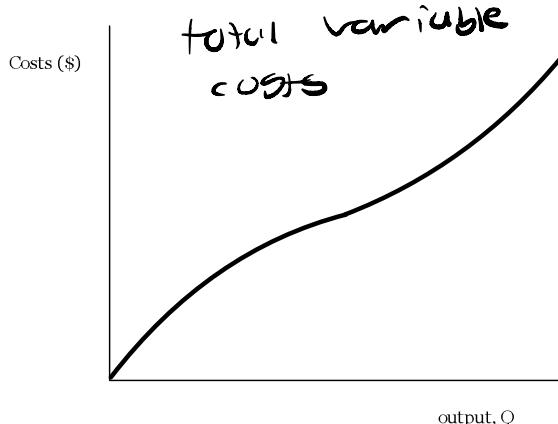
## TOTAL COSTS

- Total costs are the complete costs of producing output. There are three measures of total costs:

1. Total Fixed Cost (TFC): the total cost of fixed assets a firm uses in a given time period.
  - Includes: rental payments, insurance, property taxes, interest
  - TFC is a constant.
- Even if there is zero output, these payments must still be made.



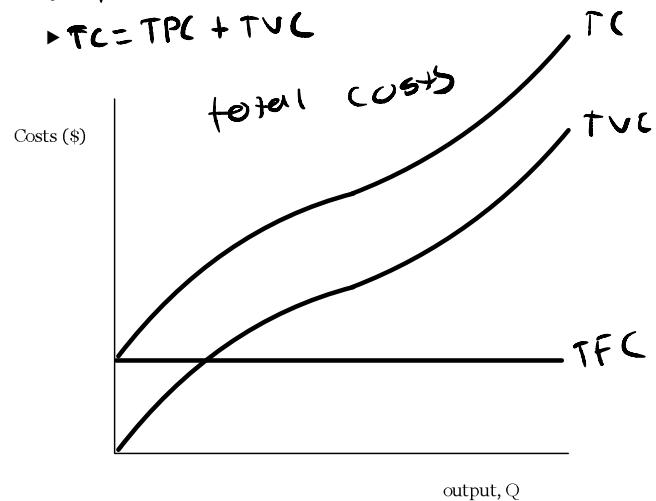
2. Total Variable Cost (TVC): The total cost of the variable assets that a firm uses in a given time period.
  - Includes: labour costs, resource costs.
  - TVC increases as output increases.



- Note the shape: TVC not steady rate due to law of diminishing returns.

3. Total Cost (TC): the total cost of all the fixed and variable factors used to produce a certain output.

►  $TC = TFC + TVC$

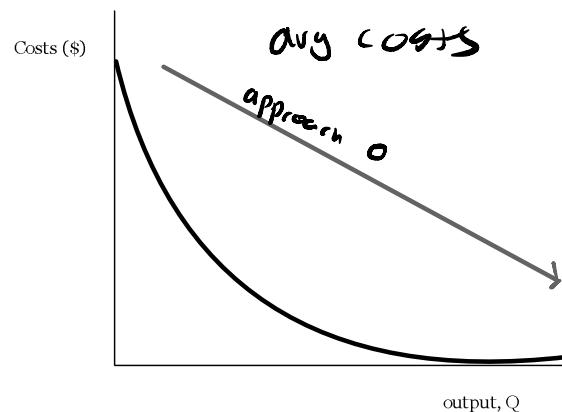


## AVERAGE COSTS

- are the costs of production per unit of output

1. Average Fixed Cost (AFC): the fixed cost per unit of output

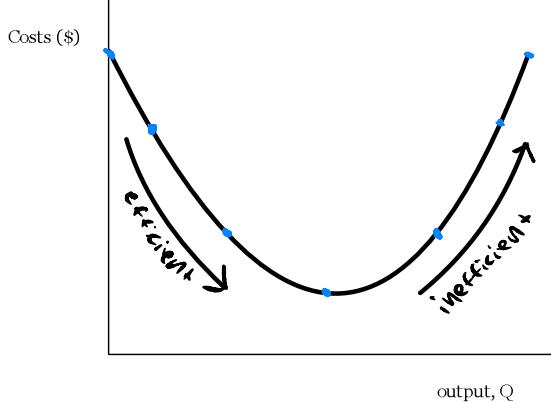
►  $AFC = \frac{TFC}{q_v}$ , where  $q_v$  = level of output



2. Average Variable Cost (AVC): the variable cost per unit of output

►  $AVC = \frac{TVC}{q_v}$ , where  $q_v$  = level of output

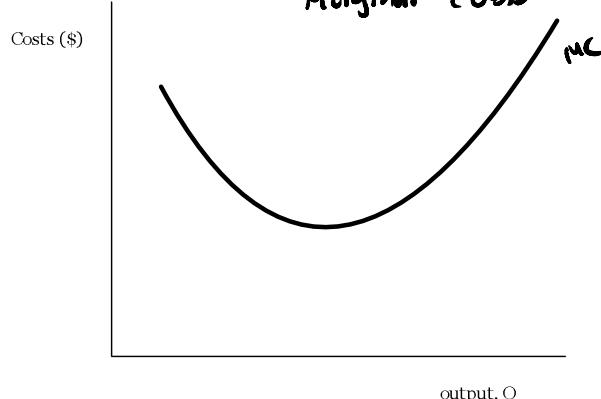
*Avg variable cost*



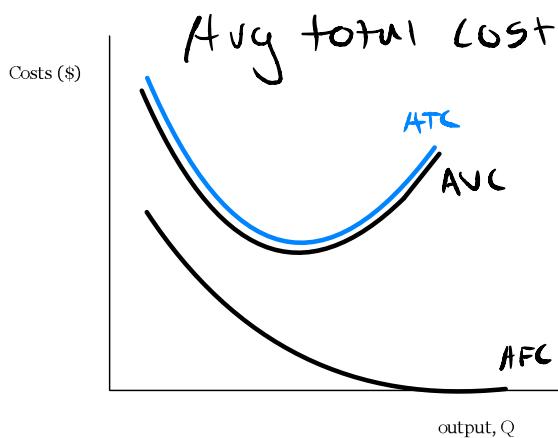
MARGINAL COST: the increase in total cost of producing an extra unit of output.

►  $MC = \frac{\Delta TC}{\Delta Q}$  change in total cost  
► change in output

*Marginal cost*



- AVC falls as output increases, and then rises as the output increases.
  - Law of diminishing returns: as more variable factors are applied to fixed factors, cost per unit eventually rises.
3. Average Total Cost (ATC): *the cost per unit of output, in total*
- $ATC = \frac{TC}{Q}$ , where  $Q = \text{level of output}$

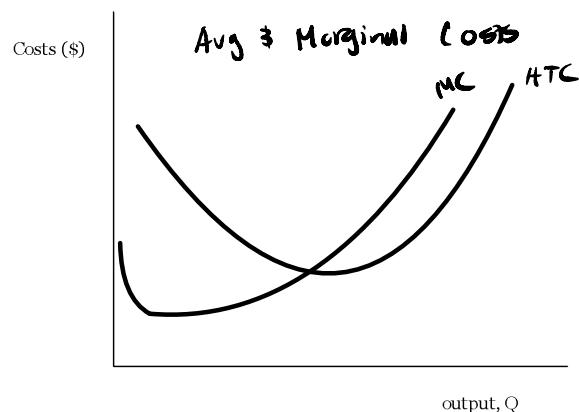


- Has the same shape as AVC.
- AVC and ATC come closer together as output increases.
- *AVC and ATC come closer together as output ↑*

- Follows the same pattern as average variable cost due to the law of diminishing returns.

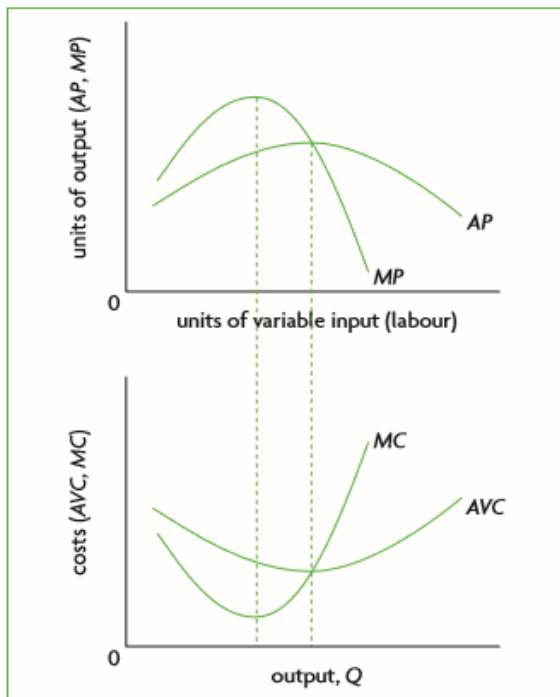
#### RELATIONSHIP BETWEEN MC AND ATC

- The MC curve intersects the AVC and ATC curves at their lowest points.



#### THE RELATIONSHIP BETWEEN PRODUCT AND COST CURVES

- ▶ Product curves and cost curves are mirror images due to the law of diminishing returns.



- ▶ At low levels of output: *MP of labour decreases, meaning the extra output of each worker rises.*
- ▶ This also means that the additional cost of one more unit output, or MC, falls.
- ▶ When MP falls... *the additional output of each extra unit of labour falls, so the additional cost of each extra unit of output is increasing.*
- ▶ The explanation is the same for AP and AVC.

## Short-Run Costs Practice Activity

### ECONOMIC COSTS

INSTRUCTIONS: Read the following information and answer the questions below.

A small firm has been operating for one year. During the year, they have:

- Paid \$40,000 in wages and salaries F
  - Paid \$100,000 for raw materials E
  - Used their own small factory, which could have been rented out for \$90,000 I
  - Used \$40,000 worth of electricity and services F
  - Received \$450,000 in total revenue
- 

In addition:

- The firm uses its own machinery, which has reduced in value by \$20,000 because of wear and tear and now has a second-hand value of \$70,000
  -  The owner of the firm has given up a job with another firm, where he would have been paid \$70,000 per year
  - The owner has invested \$60,000 of his own money into the business (the rate of interest during the year has been 5%)
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In light of the facts above:

- Identify the costs of the firm as explicit or implicit by putting an (E) or (I) beside each bullet point.
- In the space below, calculate the profits/losses made by the firm from the point of view of an accountant and an economist.

Accountant	Economist		
		$\text{Costs: } 40k + 100k + 40k$ $= 180k$  $\text{Revenue: } 450,000$ $\text{Profit} = \underline{270k}$	$330k$ $-90k$ $-20k$ $= 220k$

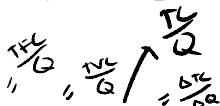
## CALCULATING SHORT-RUN ECONOMIC COSTS

INSTRUCTIONS: Read the following scenario, follow the instructions and answer the questions below.



You are a successful chicken farmer operating a small business known as Foghorn Leghorn Chicken, Inc.

Suppose that the price of labour is \$100 a worker per day and fixed costs are \$200 a day. Complete the following chart based on this information:



Units of Variable input (labour)	Total Product	TFC	TVC	TC	AFC	AVC	ATC	MC
0	0	200	0	200	-	-	-	-
1	2	200	100	300	100	50	150	50

2	5	200	180	400	40	40	80	3
3	9	200	300	500	212	323	56	20
4	14	250	400	600	1121	285	43	25
5	18	200	500	100	111	28	31	25
6	21	200	600	300	9.52	29	58	23
7	23	200	100	400	8.69	30	34	50
8	24	200	300	1000	333	25	42	100

- each column 1 mark.

### Now complete the following questions:

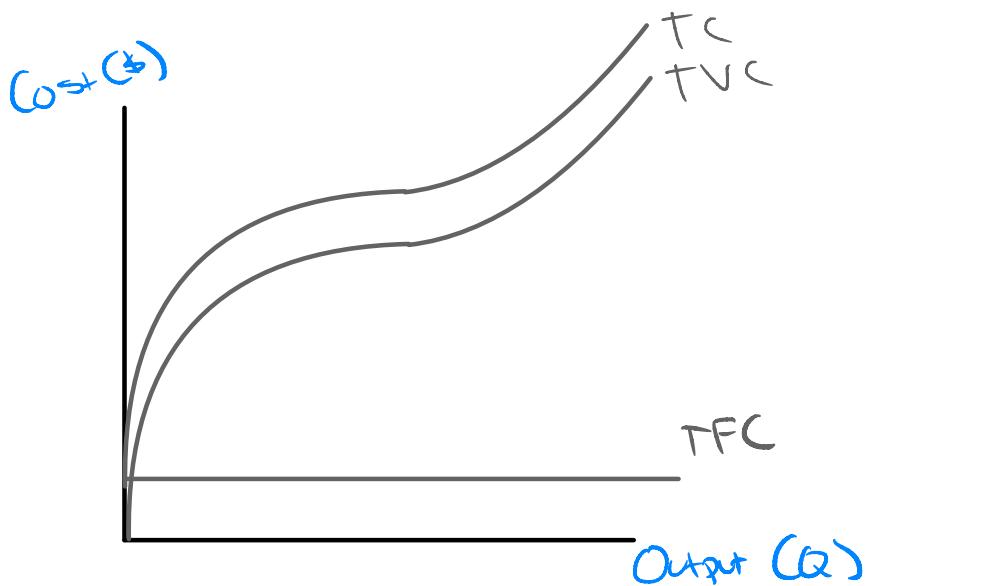
1. Will the average fixed cost ever reach 0?

No, it will approach zero.

2. At what unit of input do we see evidence of the law of diminishing returns?

at 4, MC starts increasing,  
↳ units of input \*

3. In the space below, using graph sketcher or drawing by hand, create a graph showing total cost curves for Foghorn Leghorn chicken (DO NOT USE THE DATA, just show the curves).



4. In the space below, using graph sketcher or drawing by hand, create a graph showing average/marginal cost curves for Foghorn Leghorn chicken (DO NOT USE THE DATA, just show the curves).

