Costs

# Starter - Discussion Question

**Instructions:** Discuss as a class the below question:

*What costs do businesses incur when make a good or service?*

|  |
| --- |
| Discussion Notes: |

# Presentation 1 – The Production Function

Complete the activities below so as to have a complete set of Notes:

**Definitions:** *Production*

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 Production levels depends on the amount and quality of resources (FoP) used in production

*Production Function*

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It summarises the most technically efficient combinations of L and K to produce output

We tend to consider only capital and labour as firm’s have more control here compared to other FoP

*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*N.B.* Whilst in the long run K and L are fully flexible, in the short run we often assumer that only L can be adjusted, and that K is therefore fixed

*Average Product:*

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*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Marginal Product:*

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……………………………………………………………………………………………………………………………………………………………………………………

*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Diagrams:** *Graphing total, average and marginal production function*

**Stage I:** Increasing marginal returns

With each new worker there is greater scope to specialise and gain the benefits of division of labour…

Hence labour productivity (MP) rises fast so TPL steepens (convex curve)

**Stage II:** Diminishing marginal returns

With a fixed amount of capital, the scope for specialisation and DoL begins to diminish…

So each new worker does add to total output, but at a slower rate

Labour productivity falls, so TPL flattens (concaved)

**Stage III:** Negative marginal returns

With a fixed amount of capital, there comes a point where the shop / factory becomes overcrowded

So each new worker gets in everybody else’s way and slows them down

Labour productivity continues to fall and marginal output becomes negative, so the gradient TPL is negative

# Casa Classic Cocktail Bar & Jazz Club by Roland Barrera.jpgTask (a): Bar Elli’s Production Function

**Instructions:**

* Read the extract
* Complete the table detailing how Bar Elli’s output varies with its labour input
* Represent this data graphically

**Extract**

Elliot owns a small cocktail bar called ‘Bar-Elli’ on the Costa del Sol, serving mainly British tourists. His enterprise consists of a drinks bar with 10 fixed stools and a system of 30 drinks dispensers and pumps to serve a variety of alcoholic and soft drinks. There is also a large open area around the bar, which can accommodate anything up to 100 more customers.

Recently, Bar-Elli won the ‘Spain Bar Awards’ in the ‘Most Imaginative Cocktails’ category. Hence business has rapidly picked up as Bar-Elli is now ‘the place to be seen’ amongst young trendy Brits visiting southern Spain.

Unfortunately, it will take three months before building contractors can expand the size of Elliot’s bar or install any more capital equipment. So in the meantime the only way to increase output will be to hire more staff. Of course, Elliot wants to keep labour costs down, as each bartender is paid €10 per hour on top of the €10 per hour in fixed costs. So he needs to keep productivity as high as possible. And on this note, he has experimented with up to eight extra staff all working behind the bar at the same time. The aim is to discover the most efficient number of bartenders to employ, given Elliot’s fixed amount of capital.

**Table:**

**Variable Labour**

|  |  |
| --- | --- |
| **Fixed Capital**bar= The bar |  |
| **MCj02974410000[1]1** | **MCj02974410000[1]2** | **MCj02974410000[1]3** | **MCj02974410000[1]4** | **MCj02974410000[1]5** | **MCj02974410000[1]6** | **MCj02974410000[1]7** | **MCj02974410000[1]8** | **MCj02974410000[1]9** |
| **Total Output/Product** (drinks per minute) | 1 | 4 | 9 | 16 | 25 | 32 | 35 | 36 | 34 |
| **Average Output/Product**  |  |  |  |  |  |  |  |  |  |
| **Marginal Output/Product** |  |  |  |  |  |  |  |  |  |  |



**Graph:**

# Presentation 2 – Intro to Costs

Complete the activities below so as to have a complete set of Notes:

**Recap:** *Short Run vs Long Run*

*Short Run:* Assumes that one or more of the factors of productions is fixed

*Long Run:* Assumes that all of the factors of productions are fully flexible

**Key Question:** *What is meant by costs?*

Costs refer to the expenditure a firm undergoes in production, research, retail, in order to manufacture and sell a good or deliver a service

**Definition:** *Fixed Costs*

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*Examples:* Rent on buildings, interest on loans, council tax, insurance payments, salaries each month

*Sunk costs*:Some fixed costs are also sunk costs, those which cannot be recovered if the firm closes down.

*E.g.*specific assets and advertisement expenditure.

**Definition:** *Variable Costs*

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*Examples:* Raw materials, packaging, wages (hourly rate) & commission

**Key Notes:** *Total, average and marginal costs*

*Total Cost (TC):*

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*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Average (total) cost (AC):*

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……………………………………………………………………………………………………………………………………………………………………………………

*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

It is also equal to the sum of average variable costs and average fixed costs

*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Marginal cost (MC)s:*

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It is the cost of making one additional unit

*Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

MC is the gradient function of TC

*N.B.* Technically MC = MVC, as marginal fixed costs are always zero (MFC = 0)in the short run (A sandwich shop doesn’t pay more rent if it sells 101 sandwiches as opposed to 100)

# Table Task: Fixed vs Variable

**Instructions:** Categorise the different examples of costs incurred by businesses that arose from the brainstorm starter task into either fixed or variable.

**Table:**

|  |  |
| --- | --- |
| Fixed cost examples | Variable cost examples |
|  |  |

# Presentation 3 – Total Cost Curves

Complete the activities below so as to have a complete set of Notes:

**Definition:** *Cost Curves*

……………………………………………………………………………………………………………………………………………………………………………………

**Key Notes:** *Total* *Cost Curves*

*TFC Curve:* A straight horizontal line to show that whatever the quantity produced, the fixed costs do not change!

*TVC Curve:* Starting at zero, initially they increase go up steeply, as the first few units are very expensive to produce

(a firm has to pay a worker for a whole evening shift even if there was only one unit made/customer served)

The curve then flattens off as the increased quantity allows specialisation begins to take place

(Workers can do specific tasks and become very productive at them, making many more units whilst still only paying them for one shift)

After a time the curve then steepens, as diminishing marginal returns set in

(Adding workers do still increase output, but are less productive than previous ones as they compete for a fixed amount of other resources, less output per worker but at the same wage – too many cooks!)

*TC Curve:*The total cost curve has the same shape as the TVC curve, but starts at TFC curve.

This represents the fact that total cost is the sum of total variable and total fixed costs

*Changes to The TC Curve:*

If TFC moves up or down, so too will TC.

If the shape of TVC changes (e.g. steeper or shallower

# Task (b): Bar Elli’s Total Cost Curves

**Instructions:**

* Reread the previous extract from task (a)
* Complete the table detailing how Bar Elli’s TFC, TVC and TC per hour varies with its output per minute
* Represent this data graphically

**Table**

**Variable Labour**

|  |  |
| --- | --- |
| **Fixed Capital**bar= The bar |  |
| **MCj02974410000[1]1** | **MCj02974410000[1]2** | **MCj02974410000[1]3** | **MCj02974410000[1]4** | **MCj02974410000[1]5** | **MCj02974410000[1]6** | **MCj02974410000[1]7** | **MCj02974410000[1]8** | **MCj02974410000[1]9** |
| **Total Output/Product** (drinks per minute) | 1 | 4 | 9 | 16 | 25 | 32 | 35 | 36 | 34 |
| **Fixed Cost per hour** |  |  |  |  |  |  |  |  |  |
| **Variable Cost per hour** |  |  |  |  |  |  |  |  |  |
| **Total Cost per hour** |  |  |  |  |  |  |  |  |  |

**Graph:**



Question here

# Presentation 4 – Average Cost Curves

Complete the activities below so as to have a complete set of Notes:

**Definition:** Average *Cost Curves*

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**Key Notes:** *Average* *Cost Curves*

*AFC Curve:* An asymptote. As fixed costs don’t change, initially AFC is very high, as we divide the total fixed cost by very low values of Q.

However, AFC immediately falls very sharply (Increasing quantity from 1 to 2 halves the value of AFC) and then begins to flatten off incremental increases in Q cut AFC by a smaller extent

As Q gets large, AFC gets very low tends towards zero, but will never be equal to it exactly.

*AVC Curve:* U shaped. Initially AVC is high as the first few units are very expensive to produce.

AVC falls at first as with an increasing output, there is more scope for resources to specialise and produce a greater output from the a given cost of inputs.

AVC then begins to increase again though as diminishing marginal returns to inputs set in, but a firm still has to pay the same cost for each input unit.

*AC Curve:* U shaped. Strictly above the AVC and AFC curves as it is both of them added together.

AC starts high (as AFC is high) then falls towards the AVC curve. It begins to increase like AVC as diminishing marginal returns set in.

The gap between the AC and AVC is equivalent to size of AFC. It gets increasingly narrower and AC and AVC tend towards being equal as AFC tends towards being zero.

# Task (c): Bar Elli’s Average Cost Curves

**Instructions:**

* Reread the previous extract from task (a)
* Complete the table detailing how Bar Elli’s AFC, AVC and AC per hour varies with its output per minute
* Represent this data graphically

**Table**

**Variable Labour**

|  |  |
| --- | --- |
| **Fixed Capital**bar= The bar |  |
| **MCj02974410000[1]1** | **MCj02974410000[1]2** | **MCj02974410000[1]3** | **MCj02974410000[1]4** | **MCj02974410000[1]5** | **MCj02974410000[1]6** | **MCj02974410000[1]7** | **MCj02974410000[1]8** | **MCj02974410000[1]9** |
| **Total Output/Product** (drinks per minute) | 1 | 4 | 9 | 16 | 25 | 32 | 35 | 36 | 34 |
| **Average Fixed Cost per hour** |  |  |  |  |  |  |  |  |  |
| **Average Variable Cost per hour** |  |  |  |  |  |  |  |  |  |
| **Average Cost per hour** |  |  |  |  |  |  |  |  |  |

**Graph:**



# Presentation 5 – Marginal Cost Curves

Complete the activities below so as to have a complete set of Notes:

**Key Notes:** *Marginal Cost Curves*

*MC Curve:* ‘Nike Swoosh’ shaped. Initially starts quite high as the first few units are expensive to produce.

MC falls at first as a higher quantity gives scope for inputs to become more specialised and an extra input gives a greater increase in output. Therefore marginal output becomes less expensive

However, as diminishing marginal returns set in, the MC curve begins to rise, getting steeper and steeper as marginal inputs have an ever decreasing return, but still cost the same

**Key Observation:** MC intercepts AC at AC’s lowest point. This must ALWAYS be the case.

To see this, we need only remember that MC is the cost of producing another unit

a. …………………………………………………………………………………………………………………………………………………………………………………

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b. …………………………………………………………………………………………………………………………………………………………………………………

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c. …………………………………………………………………………………………………………………………………………………………………………………

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With these three scenarios in mind, it must be the case that AC = MC can only occur when AC is minimised, the gradient of AC is 0

# Presentation 6 – Changes in Costs

Complete the activities below so as to have a complete set of Notes:

**Key Notes:** *Changes in Fixed Costs*

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**Diagram:** When there is a rise in fixed costs, AC curve shifts up from AC to AC1

*E.g.* An increase in rent

The new AC curve will also move rightwards to maintain the intersection of MC at the minimum point of AC

**Key Notes:** *Changes in Variable Costs*

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**Diagram:** A rise in variable costs sees an upward shift in AC (AC to AC1) and MC (MC to MC1)

*E.g.* An increase in the prices of raw materials

The new MC and AC curves still maintain their intersection at AC’s minimum point

# Task: Costs in the Short-Run

**Instructions:**

* Complete the table
* Sketch the results for the average costs and the marginal cost in the graph
* Answer the questions

**Table:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| **Output** | **Total Fixed Costs** | **Total Variable Costs** | **Short-Run Total Costs (2)+(3)** | **Short-Run Average Fixed Cost (2)/(1)** | **Short-Run Average Var. Cost (3)/(1)** | **Short-Run Average Total Costs (4)/(1)** | **Short-Run Marginal Costs (4)/(1)** |
| 1 | 225 | 85 |  |  |  |  |  |
|  |
| 2 | 225 | 150 |  |  |  |  |
|  |
| 3 | 225 | 210 |  |  |  |  |
|  |
| 4 | 225 | 300 |  |  |  |  |
|  |
| 5 | 225 | 475 |  |  |  |  |
|  |
| 6 | 225 | 870 |  |  |  |  |
|  |



**Graph:**

**Questions:**

1. What do you notice about the **SR-AFC** curve? Why does it behave in the way that we observe?

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1. What do you notice about the **SR-MC** curve and its relationship with other curves? (**Clue**: think about the concept of ‘marginal product’).

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1. What shape does the **SR-AVC** curve take? Why does it behave in this way? (**Clue**: think about the concept of ‘average product’).

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1. What shape does the **SR-ATC** curve take? Why does it behave in this way? (**Clue**: think about the components of SATC, then look at their curves separately).

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1. What is the impact of an increase in MC, for example if productivity falls?

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1. What is the impact of an increase in FC, for example an increase in rent?

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1. What is the impact of an increase in VC, for example an increase in the price of a raw material?

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# Presentation 7 – Long Run Costs

Complete the activities below so as to have a complete set of Notes:

**Key Notes:** *An important clarification*

In the short run, the SRAC curve (referred to as just AC previously) reflects changes in labour input only, as capital is assumed to be fixed in the short-run

*However:*in the long run firms can vary capital as well as labour

They will purchase the level of capital that is right for the level of expected output

To achieve a new level of output, firms can now change Capital (K) as well as Labour (L)

Whenever K changes, the firm’s SRAC curve will change (as the short run, i.e. fixed, level of capital is changed)

**Definition:** *Long Run Average Costs*

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*Long-Run Average Cost (LRAC) curve:* an ‘envelop’ curve that is found by tracing a line that is tangential to one single point of each SRAC curve

**Diagram:** *LRAC Curve*

*A wide U-shape with three phases*

1. Economies of scale (SRAC1)

A fall in long-run average costs as output rises

Linked to increasing returns to scale (input : output ratio)

1. Constant returns to scale (SRAC2)

Where long-run average costs are neither rising nor falling

This is the lowest point of the LRAC, the minimum efficient scale (MES) and is productively efficient!

1. Diseconomies of scale (SRAC3)

A rise in long-run average costs as output rises

Linked to decreasing returns to scale

**Key Notes:** LRAC Concepts

**Definition:** *Minimum Efficient Scale*

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It is the level of output at which LRAC stops falling (The LRAC curve’s gradient is zero at this point)

Lowest cost production occurs

**Definition:** *Productive efficiency*

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Operating along the lowest level of the LRAC curve

The ‘optimum level of production’

**Key Question:** How does the idea of returns to scale (a theory of production) link to costs?

*Fill in the gaps in the table below*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale of firm - inputs** | **Type of returns** | **Output** | **Total Costs** | **AC (TC/Q)** |
| Increase by 50% |   | Increases by 50% | Increased by 50% |   |
| Increase by 50% |   | Increases by more than 50% (eg 75%) | Increased by 50% |   |
| Increase by 50% |   | Increases by less than 50% (eg 25%) |  Increased by 50% |  |

# Task: Costs in the Long-Run

**Instructions:**

* Complete the table
* Sketch these results in the graph
* Answer the questions

|  |  |  |  |
| --- | --- | --- | --- |
| **Output ('000 units per week)** | **Long-Run Total Cost (£'000)** | **Long-Run Average Cost (£)** | **Long-Run Marginal Cost (£)** |
| 0 | 0 |  |  |
|  |
| 1 | 32 |  |
|  |
| 2 | 48 |  |
|  |
| 3 | 82 |  |
|  |
| 4 | 140 |  |
|  |
| 5 | 228 |  |
|  |
| 6 | 352 |  |
|  |



**Questions:**

1. Identify the output level at which LRAC is at a minimum.

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1. Identify the output level at which LRAC = LRMC

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1. What is the term given to this level of output?

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1. Within what range of output does the firm enjoy economies of scale?

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1. Within what range of output does the firm suffer diseconomies of scale?

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1. If you could measure the returns to scale, what would characterise the point where LRAC is at a minimum?

……………………………………………………………………………………………………………………………………………………………………………………

# Test Yourself: Costs

**Instructions:** Complete the below questions to test your understanding of revenue curves



1. Sketch on the above diagram a corresponding MC curve for this AC curve
2. At what level of output is average cost minimised?

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1. What is total cost at this output?

……………………………………………………………………………………………………………………………………………………………………………………

1. Annotate the diagram with to show an area that represents this cost

From now, take total fixed costs to be equal to £10

1. What is AFC at the output where AC is minimised?

……………………………………………………………………………………………………………………………………………………………………………………

1. What is AVC at the output where AC is minimised?

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1. What is TVC at the output where AC is minimised?

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1. At what quantity is the total cost equal to £20?

……………………………………………………………………………………………………………………………………………………………………………………

1. What is the average cost at this output?

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1. What are the TFC, AFC, TVC and AVC at this output?

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1. At what other level of output does this firm experience the same average cost?

……………………………………………………………………………………………………………………………………………………………………………………

1. What is the total cost at this output?

……………………………………………………………………………………………………………………………………………………………………………………

1. What are the TFC, AFC, TVC and AVC at this output?

……………………………………………………………………………………………………………………………………………………………………………………

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# Assignment: Costs

**SECTION A**

1. The diagram shows the total cost function for a company producing mobile phones:

****

 Calculate average fixed cost for this firm at an output of 1000 units.

[3]

1. A firm is experiencing a fall in short-run average total costs as output rises. Which of the following must be true?

[1]

**A** Marginal costs are falling

**B** Marginal costs are rising

**C** Marginal costs are above average total costs

**D** Marginal costs are below average total costs

**E** There are economies of scale

1. Which of the following best explains the shape of the short-run marginal cost curve between X and Y?

[1]



**A** The law of diminishing marginal returns

 **B** The law of increasing marginal product

 **C** Average costs are rising

 **D** Average variable costs are rising

 **E** Economies of scale

1. Explain what is meant by the term ‘law of diminishing returns’.

[3]

1. A mobile phone company finds that its total costs are best illustrated by the following curve:

****

Examine closely the range of output AB.

1. What is happening to average costs over this range? Explain your answer.

[2]

1. What is happening to marginal costs over this range? Explain your answer.

[2]