2.3 The Firm (Supply)

At the end of this a student should be able to:

- evaluate the economic role of firms in an economy, explaining how positive and negative incentives influence economic activity
- graphically represent, calculate and describe the relationship between total, marginal and average revenue and costs
- apply the distinction between the short and long run in analysing the implications of a firm's costs and revenue situation
- explain and illustrate the conditions for profit maximisation in terms of marginal cost and marginal revenue
- analyse the role of economies and diseconomies of scale in determining the size of firms
- critique the reasons a firm may pursue objectives other than profit maximisation

Role of Business in our economies

- **Satisfy market demand**
  - Business make products/service to satisfy the demand of the public
- **Improve efficiency**
  - Business aim to make the most efficient use of scarce resources to ensure that products are produced at the lowest cost possible.
- **Employment Creation**
  - In order to satisfy consumer demand business' must employ people. This creates a flow of income in our economy which boosts National Incomes.
- **Generate Tax revenue for the government**
  - Business pay corporation tax, commercial rates, employers' PRSI which contributes to funding the exchequer.

Positive & Negative Economic Incentives for Businesses

Economic incentives are financial motivations for businesses to take certain actions.

- **Tax Incentives**
  - Tax incentives are reductions in tax that the government makes in order to business activity.
  - For example in Ireland certain companies do not have to pay corporation tax on their profits, subject to meeting certain conditions, for a period of time after commencing business. R&D tax credit
  - As an incentive to companies carrying out certain R&D activities, a tax credit may be available which reduces a business' tax liability if they are carrying out R&D.
- **Grants**
  - The government will give business grants, particularly to startup businesses or businesses seeking to expand, as a way of boosting economic activity. Businesses can receive grants from a variety of state agencies including the IDA, Local Enterprise Offices, Enterprise Ireland.
  - Grants do not have to be repaid but must be used for the specific purpose for which they were granted. Eg: A grant to build a website cannot be used for staff social events
- **Subsidies**
  - Subsidies are government incentive programs that provide set amounts of money to businesses in order to help them grow by assisting in lowering the cost of production. In Ireland agriculture is heavily subsidised through EU funding to ensure that farmers have a basic level of income
- **Negative incentives**

- Negative economic incentives, or disincentives, punish businesses financially for taking certain actions. Incentives are a way of encouraging specific actions. Carbon tax or fines from the Revenue for non-compliance incentivise businesses to change their behaviour.

Costs of Production

Explicit and Implicit Costs

- **Explicit costs** are out-of-pocket costs for a firm—for example, payments for wages and salaries, rent, or materials.
- **Implicit costs** are a of opportunity cost. For example, an entrepreneur who owns a business could use her labour to earn income at another job – this is one of the opportunity costs of running the business and this cost should be covered by the business' revenue.
- As economists, rather than accountants, we argue that firms must cover both their explicit and implicit costs.
- **Types of Profit**
  - **Accounting profit** is the total revenues minus explicit costs
  - **Economic profit** is total revenues minus total costs—explicit plus implicit costs.
- Example here
- Helpful video here

Short Run versus the Long Run

In the study of economics, the long run and the short run don't refer to a specific period of time, such as five years versus three months. Rather, they are conceptual time periods, the primary difference being the flexibility and options decision-makers have in a given scenario.

The **short run** is a period of time so short that **at least one input (factor of production) is fixed.** Typically, it is the amount of Capital or Land that is fixed.

The **long run** is a period of time long enough for **all factors of production to be varied.**

Consider the example of a hockey stick manufacturer. A company in that industry will need the following to manufacture its sticks: Raw materials such as fibreglass, Labour, Machinery, a factory. Suppose the demand for hockey sticks has greatly increased, prompting the company to produce more sticks. It should be able to order more raw materials with little delay, so consider raw materials to be a variable input. Additional labour will be needed, but that could come from an extra shift and overtime, so this is also a variable input.

Adding an extra factory or expanding the current one, on the other hand, is certainly not something that could be done in a short period of time, so this would be the fixed input and would form part of the long run perspective. Using the definitions above, the short run is the period in which a company can increase production by adding more raw materials and more labour but not another factory. Conversely, the long run is the period in which all inputs are variable, including factory space, meaning that there are no fixed factors or constraints preventing an increase in production output.

Helpful video **here and** more detailed video **here**

Short-Run Production

The Law of Diminishing Marginal Returns

- **<u>The Law of Diminishing Marginal Returns</u>** states that as extra quantities of a variable factor are applied to fixed quantities of a fixed factor, the extra output eventually begins to diminish. Diminishing returns represents an increase in costs.

Sample Exam Question: Using the table below, state after which level of employment diminishing marginal returns set in. Explain your answer.

No. of persons employed	1	2	3	4	5
Total Output (in units)	14	30	50	64	76
Marginal Output (in units)	14				

Sample Answer: The point after which Diminishing Returns set in:
When the _____ person is employed / After the ____ person.

- **Fixed Costs**
  - Fixed costs are costs that **do not vary with quantity of output**. Examples include rent, loan, loan repayments and rates on premises. The fixed cost curve is plotted below.

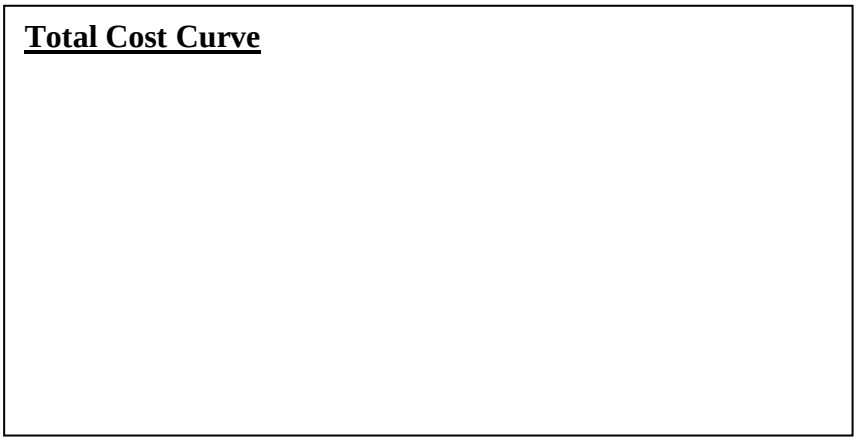
<u>Fixed Cost Curve</u>

- **Variable Costs**
  - Variable costs are costs that **vary with output**. If the firm produces nothing, then its variable costs are zero. As output increases, so too do the electricity costs, raw material costs and labour costs of the firm. That is, these costs vary, depending on the size of the quantity produced. The variable cost curve is plotted below.

<u>Variable Cost Curve</u>

- **Total Costs**
  - Total costs (TC) = Fixed Costs + Variable Costs

Total Cost Curve



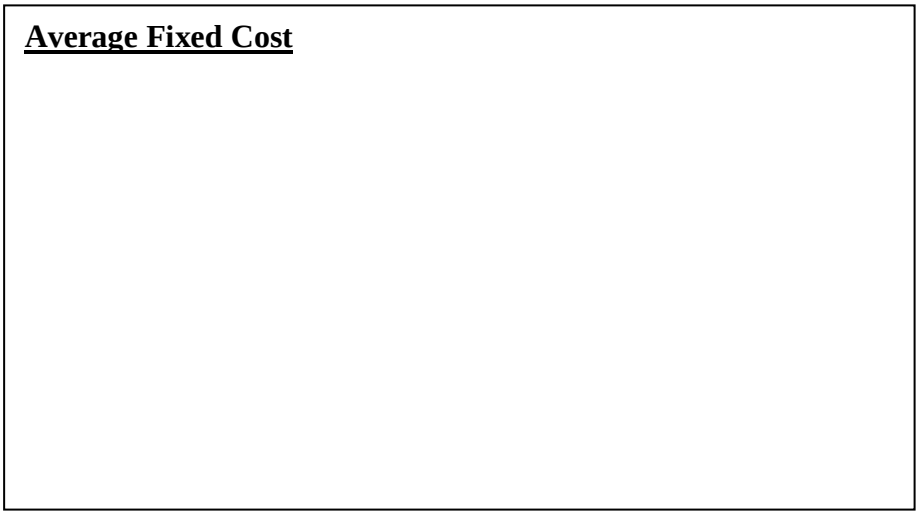
Average Fixed Costs, Average Variable Costs, Average Total Costs, Marginal Costs

- **Helpful notes and videos – Tutor2U**

- **Average Fixed Costs**
  - Average Fixed Costs (AFC) are the fixed costs per unit of **output** or FC/Q.

  - The diagram below shows that the AFC falls steeply and then flattens (yet continues to slope gently) as output increases. This is due to the fact that as more is produced, these **fixed costs are being spread over a greater quantity of output.**

Average Fixed Cost



- **Average Variable Costs**
  - Average variable costs (AVC) are the variable costs per unit or VC/Q. The diagram below shows that as AVC rises as a higher quantity is produce. This is due to the **Law of Diminishing Marginal Returns**. As output increases, more and staff are hired for example, and less extra output is produced due to the Law of Diminishing Marginal Returns. This represents an increase in costs.

Average Variable Cost

Average Total Cost (Average Cost)

- **Note:** average total cost is more commonly referred to as average cost (AC). It is also sometimes referred to the **short-run average cost curve (AC**)). The AC is U shaped.

AC Curve

- **Shape of the Average Cost Curve in Short Run**
  - The Short-run average cost curve is more commonly referred to as the average cost (AC) curve.
  - The AC is made up of average fixed costs plus average variable costs. The average cost curve shown previously is U-shaped for the following reason
  - It also slopes down due to:

- Specialisation of labour: As the firm increases output it will hire more staff. As more staff are hired they can specialise. This makes production more efficient and such efficiency represents a reduction in costs.
- Fixed costs spread out over greater number of units

  - The AC curve then slopes up
    - This is due to the effect of the upward sloping AVC curve and the Law of Diminishing Marginal Returns.

- **Marginal Cost**
  - This is the **extra cost of producing an extra unit of output** or $\Delta TC/\Delta Q$.

Marginal Cost Curve

Helpful video here and here

- **Relationship between the Marginal Cost and Average Cost Curve (AC)**
  - MC cuts the AC at the lowest point on the AC curve. In summary, the relationship between MC and AC is as follows:
    - When MC is below AC, AC is decreasing (dragged down).
    - When MC is above AC, AC is rising (dragged up).
    - When MC = AC, AC is at a minimum (lowest point).
  - Helpful video here

Relationship between AC and MC curve

Long-Run Production

Internal and External Economies and Diseconomies of Scale

Economies of Scale (Internal & External)

Internal Economies of scale are forces **within a firm** which cause the **average unit costs** of that firm to **decline** as the **firm grows in size.**

- **Increased use of specialised machinery**
  - A firm may be able to buy/use more specialized equipment/machinery resulting in a reduction in unit costs/machinery fully utilized.
- **Greater specialisation of workers**
  - If a particular job can be separated into separate and distinct components it may result in a reduction in costs.
- **Construction economies**
  - Large plants cost less per cubic foot than smaller ones.
- **Buying economies**
  - Larger quantities bought may result in bigger discounts.
- **Economies in distribution**
  - Lower unit cost of delivery.
- **Financial economies**
  - Larger firms may avail of lower interest rates/larger firms better chance of acquiring a loan.
- **Managerial economies**
  - As a firm grows, management costs may not grow in proportion to the growth in the firm.
- **Production Process economies**
  - A large firm may be able to run one process into the next without costly Discontinuities.
- **Indivisibility problem reduced.**
  - If the volume of production increases, the unit cost may be lower e.g. glass-making furnaces may operate around the clock to save costs of cooling and re-heating/ full capacity used.
- **Marketing economies**
  - Savings in the cost of advertising e.g. NIKE advertising globally/ bigger firms bigger advertising campaigns.

External Economies of scale are forces **outside a firm** which cause the **average unit costs** of that firm to **decline** as the **industry grows in size.**

- **Better infrastructure**.
  - As roads / communications etc. improve they will benefit all firms.
- **Bulk purchasing of raw materials by the industry.**
  - As an industry expands firms require more materials / components. These may become cheaper as suppliers expand to meet increased demand.
- **Development of specialist firms**
  - Some of the jobs, which a firm once performed may be contracted out to specialist firms at reduced costs e.g. the supply of linen to hotels.
- **Development of separate R & D units**
  - As industry becomes very large, R&D agencies may set up to provide facilities for individual firms / the costs of research may be shared between firms *or* with a public body like Teagasc.
- **Suppliers of Machinery**

        - Manufacturers of machinery will be encouraged to design, develop and produce machines for expanding industry. These advanced machines will help reduce costs.
    - **Development of Training Courses**
        - Workers in expanding industries may be provided with training courses by VECs, FÁS thereby helping them become more efficient.
    - **Supports from Public Bodies.**
        - Some public bodies help particular industries e.g. Failte Ireland / FAS may help firms in the tourism industry.

Diseconomies of Scale (Internal & External)

Internal diseconomies of scale are forces **within a firm** which cause the **average unit costs** of that firm to **increase** as the **firm grows in size.**

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    - **Communication costs**
        - As a firm grows in size, internal communication from management to staff becomes more difficult and inefficient.
    - **Unmotivated staff**
        - The benefits of specialization outlined above may be cancelled out as a result of staff becoming bored and unmotivated by carrying out repetitive tasks.

External diseconomies of scale are forces **outside a firm** which cause the **average unit costs** of that firm to **increase** as the **industry grows in size.**

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    - **Staff shortages**
        - As the IT industry expanded in Ireland in the late 1990s the demand for qualified IT personnel rose, leading to shortages of suitably qualified workers. Employers had to offer higher wages to attract staff – this represented an increase in costs to individual firms as a result of an increase in the size of the industry.
    - **Raw materials may increase in price/become scarce**
        - As an industry expands, firms may have to compete for raw materials which could raise the price (costs) of such raw materials or even cause shortages.
    - **Lack of Infrastructure expansion**
        - The expansion of infrastructure may not keep pace with the expansion of the industry. This could result in an increase in the industry's delivery, communications and waste disposal.

Returns to Scale

- In the long run, all factors of production are variable. How the output of a business responds to a change in factor inputs is called **returns to scale**

Numerical example of long run returns to scale

Units of Capital	Units of Labour	Total Output	% Change in Inputs	% Change in Output	Returns to Scale
20	150	3000			
40	300	7500	100	150	Increasing
60	450	12000	50	60	Increasing
80	600	16000	33	33	Constant
100	750	18000	25	13	Decreasing

Consider the table above that shows added capital and labour inputs:

- When we double the factor inputs from (150L + 20C) to (300L + 40C) the % change in output is 150% - increasing returns
- When the scale of production is changed from (600L + 80C) to (750L + 100C) then the percentage change in output (13%) is less than the change in inputs (25%) i.e. decreasing returns

- Increasing returns to scale occur when the % change in output > % change in inputs
- Decreasing returns to scale occur when the % change in output < % change in inputs
- Constant returns to scale occur when the % change in output = % change in inputs

Shape of Long run Average Cost Curve

Different factory/business sizes have different cost structures. Each factory size has an indivudal AC associated with it. Firms that aim to maximise profits will want to produce at the minimum point of the AC curve associated with the relevant size of the factory. As the factory expands it will have different factory sizes and hence different AC curves associated with each one. No matter what the size of the operation is, it will always wish to produce at the lowest point on the AC curve.

If we join the lowest point of the various AC curves, then we end up with a hollow U-shaped AC curve. It slopes **downwards** initially as the firm expands due to **economies of scale outweighing diseconomies of scale (increasing returns to scale)**. The LRAC curve then **rises** as **diseconomies of scale outweigh economies of scale (decreasing returns to scale).**

LRAC Curve

Helpful video here and here

Revenue

Total Revenue (TR) = Price x Quantity
Average Revenue (AR) = Total revenue/Quantity
Marginal Revenue (MR) = ΔTR/ΔQ. Marginal revenue is the extra revenue earned from producing an extra unit of the good.
Profit = Total Revenue – Total Cost

Profit

- **Profit Maximisation: How do firms decide the quantity to Produce/Supply?**
  - One common feature of firms in most markets is **profit maximisation**. This means firms supply a quantity that ensures the maximum possible level of profits. The profit-maximising level of output is the level of output associated with the point where MR is equal to MC, and MC continue to rise
  - If a firm increases production to a level where **marginal revenue (MR) of producing an extra unit of output is greater that the marginal cost (MC**) of producing it, **then the firm can make higher profits by increasing output.**
  - If a firm increases production to a level where the **marginal cost (MC) of producing the extra output is in excess of the marginal revenue (MR) earned from producing it,** then the production of these extra units **adds more to costs than revenue**, and so the firm should **reduce the output it produces.**
  - The **profit maximising level of output to produce is the output where MR = MC, and MC continues to rise**

- **Helpful video here**

- **Profit Maximisation: Levels of Profit**
  - After identifying the quantity to supply, we can identify the profits that can be earned by supplying that quantity by means of looking at the average revenue (AR) and average cost (AC) curves.

  - **Normal profits** are earned if the firm produces where **AR = AC**. A firm must earn normal profit at the very minimum if it is continue in business. **As a result, normal profit is treated as a cost of production.** It is included in average costs.

  - **Supernormal Profits** are earned if the firm produces where **AR>AC.** This is profit that is earned in excess of the minimum amount necessary to continue in business (normal profit).

  - **A loss** is made if the firm produces where AR < AC.

- **Sample Question**

Ocean Blue Ltd produces two boats weekly and incurs the following weekly costs:

- Rent: €1,200
- Raw materials: €2,000
- Labour: €1,600
- Normal profit: €1,000

What is the minimum price at which **each** boat can be sold if production is to continue:
(i) in the short run? (ii) in the long run?

Short run:

	€
Raw Materials	2,000
Labour	1,600
Total variable costs	3,600
	2
Minimum price per boat	1,800

Explanation: a firm must cover its variable costs in the short run

Long run:

	€
Raw Materials	2,000
Labour	1,600
Rent	**1,200**
Normal profit	**1,000**
Total costs	5,800
	2
Minimum price per boat	2,900

Explanation: a firm must cover all its costs in the long run

Shutdown Rule

- In the **short run**, a **firm** that is operating at a loss (where the revenue is less that the total cost or the price is less than the unit cost) **must** decide to operate or temporarily **shutdown**. The **shutdown** rule states that "in the short run a firm should continue to operate if average revenue (AR) exceeds average variable costs (AVC)."
- A firm will choose to implement a production shutdown when the revenue received from the sale of the goods or services produced cannot cover the variable costs of production. In this situation, a firm will lose more money when it produces goods than if it does not produce goods at all. Producing a lower output would only add to the financial losses, so a complete shutdown is required.
- As all costs are variable in long run, a firm's revenue must at least cover ALL COSTS in the long run. AR must at least equal AC.

Reasons why firms may have objectives other than profit maximisation

- **To become a takeover target**
  - Some firms may be focused on building market share or acquiring particular assets that would make them attractive to a takeover by a larger firm. In order to achieve these goals a firm may not be charging as high a price of possible or may be incurring losses.
- **To solve a social problem**
  - Social enterprises are focused on solving social environmental issues and not on making profits. Eg: Foodcloud
- **Pursuing maximum profit may involve more risk**
  - Some entrepreneurs may not wish to push production to the point where MC=MR as this may involve more money being invested which may carry more risk, or perhaps more time being taken up which may not be of interest to the owner
- **Meeting stakeholder expectations**
  - Businesses must consider the objectives of their stakeholders. These stakeholders include employees, customers, suppliers, investors and governments. The objectives of employees are to earn better wages and learn new skills; customers want better quality for a reasonable price; governments want businesses to pay taxes and create employment; suppliers want prompt payments and the general public may want businesses to produce less pollution. Trying to meet these expectations may impact of profit maximisation

Reasons why small firms survive in the Irish economy.

- **Small size of market / Scale of operation**
  - The restricted size of the market may not facilitate the operation of large scale business, e.g. in a rural area a small shop may be viable while a large supermarket may not.
- **Personal services**
  - Consumers may desire personal attention in the provision of goods or services and a small firm may be the only type of business which can provide this e.g. a plumber providing repair services to households.
- **Consumer loyalty**
  - A small firm may have built up a reputation over the years in the provision of goods and services to its customers and consumers may respond by their loyalty to that firm – making it difficult for other firms to gain a foothold.
- **Desire of citizens to maintain their community as viable.**
  - Citizens in smaller communities may support local business so that the continuity of supply is ensured, thus helping to maintain a viable community e.g. in many areas throughout Ireland communities wish to maintain the existence of 'community' hospitals.
- **Traditional / Niche markets**
  - The type of product / service being supplied might make it more suitable for a small firm. Examples include: wedding planners; handmade/ craft products; perishable products etc.
  - A small firm may find that it finds it easier to locate close to the market where it might be difficult for a larger firm to do so e.g. roadside sellers of local produce can be flexible in choosing their location.
- **Exclusive nature of the commodity being provided**

        - Heavy goods which are costly to transport may be manufactured locally on a small scale to supply nearby markets e.g. the manufacture of concrete blocks in areas which service local markets.
    - **Availability of capital**
        - Small firms may find it very difficult to get the finance to expand their operations and hence the business remains small.
    - **Membership of voluntary groups**
        - Some firms producing on a small scale may offset the disadvantage they have in competition with large producers by a joint marketing strategy with other small suppliers – hotel groups, individually owned grocery shops trading under a shared name (Spar, Centra etc).

- **Actions The Government Could Take To Improve The Competitiveness Of Small Firms.**
    - **Reduce the minimum wage / wage restraint**
        - Employers would be able to get cheaper labour and therefore reduce costs. By negotiations for example through lowering direct taxes, the government could reach agreement with the social partners to limit pay rises
    - **Reduce utility charges**
        - A reduction in costs for electricity, gas, postage, waste charges etc. or any state service provided for small businesses would help reduce costs of production.
    - **Reduce taxation**
        - A decrease in indirect taxes, e.g. VAT or excise duty on fuel or raw materials would reduce costs to small business. A decrease in direct taxes e.g. CPT would help firms reduce their costs. A reduction in income tax may encourage wage moderation thus helping firms to lower their costs.
    - **Reduce bureaucracy.**
        - Eliminate restrictions and excessive paperwork, thereby reducing administrative costs.
    - **Subsidies to firms**
        - By reducing the rate of employer's PRSI it becomes cheaper to employ labour. By subsidising training costs / export credit insurance a firm's costs may decrease making them more competitive.
    - **Develop infrastructure.**
        - Traffic gridlock/lack of broadband and poor infrastructure generally increase costs for small business. By improving the infrastructure it should become more efficient and therefore less expensive to move goods and services around the country.