Firms - Production & Costs

Important Definitions
Fixed cost = Cost that does not vary with output level
Variable cost = Cost that varies with output level
Marginal cost = Cost incurred in producing an additional unit of output
Economies of Scale = When increasing the scale of production leads to a lower cost per unit of output
Diseconomies of Scale = When increasing the scale of production leads to a greater cost per unit of output
Internal Economies of Scale = Savings in costs that occur to a firm as a result of the firm's expansion which is the result of the firm's own policies and actions
Internal Diseconomies of Scale = Increases in costs that occur to a firm as a result of the expansion of the firm which is the result of the firm's own policies and actions
External Economies of Scale = Savings in costs that occur to all firms in an industry as a result of the expansion of the industry or the concentration of firms in a certain location
External Diseconomies of Scale = Increases in costs that occur to all firms in an industry as a result of the expansion of the industry or the concentration of firms in a certain location

Traditional objective of firms:

- Maximise profits/Minimise losses
    - Shareholders goal is to maximise profits due to ↑ dividends
    - ↑ Profits ⇒ ↑ Ability to conduct non-price competition (e.g. R&D, advertising) ⇒ ↑DD + More price inelastic in the LR
    - ↑ Profits ⇒ ↑ Reserves which can be drawn upon to survive times of economic recession even with subnormal profits
- Profits = Total Revenue - Total Cost
    - Types:
        - Supernormal (+ve)
        - Normal (0)
        - Subnormal (-ve)
    - **When discussing profits, always discuss revenue and cost factors

Deviation from profit maximisation objective:

- Growth Maximisation
    - Max growth in sales at P=AC
    - ↑ Growth ⇒ ↑ Market share ⇒ Lower risk of takeover + ↑DD and more price inelastic in LR ⇒ At profit max level in LR, able to earn ↑ profits. Thus, willing to accept ↓ profits in SR
    - Growth can be achieved by mergers or by predatory pricing in order to force competitors out of the market
- Managerial theories of firm behaviour

    - In larger firms, there is separation of ownership (shareholders) from control (directors, managers)
    - Prinicipal-agent problem
        - Objective of principal (shareholders) different from agents (directors, managers)
        - Shareholders → Maximise profit
        - Managers → Maximise managerial utility
            - Maximise sales revenue/growth to maximise their salary
            - Maximise staff under their control/power over new investment to maximise their feeling of power
            - Maximise fringe benefits
    - e.g. Managers may maximise Sales Revenue
        - Max revenue at MR=0
        - Seen more favourably by consumers and financial institutions
        - ↓ Cuts in no. of staff employed
        - ↓ Fall in loans from financial institutions ⇒ Easier to raise funds for new investments ⇒ ↑ Power over new investments
        - ↑ Salary of managers/executives
- Satisficing Behaviour
    - Complex environment with many different parties
    - Different self-interests which can be conflicting in nature
    - End result is a compromise which aims to satisfy the needs of all the different parties but does not maximise anything
    - e.g. Managers earn just enough profit to satisfy the demands of the shareholders and after that, focus on other objectives such as increasing their salary by increasing sales
    - e.g. Workers are just productive enough to satisfy the demands of their managers and after that, focus on other objectives such as leisure time
- Nationalised industries
    - Owned by the state
    - Social and political objectives apart from profit maximisation
        - Seek to maximise social welfare and allocative efficiency
        - Produce at P=MC to ensure allocative efficiency
        - Produce at P=AC to ensure long term sustainability + ↓ allocative inefficiency
- Imperfect information
    - May not have detailed information about demand and cost conditions ⇒ Don't know MR and MC curves ⇒ Unable to produce at MR= MC
        - Unable to effectively use economic concepts
- Social enterprise
    - Main objective to carry out social/environmental mission but using market based strategies
    - Profit not a primary goal
- Complacency
    - Firms with long run supernormal profits may become become complacent and hence X-inefficient

        - e.g. Lucasfilm built the Sandcrawler building in Fusionopolis ⇒ Extravagant spending
    - In addition, imperfect info may lead to firms having higher costs of production than required
        - e.g. Firms may purchase raw materials from a firm that they have always dealt with as opposed to the cheapest firm

Short run
Assumptions:

- Only 2 factors of production:
    - Labour —> Variable factor
    - Capital —> Fixed factor

Production:

- Law of diminishing marginal returns
    - As more units of a variable factor are applied to a given quantity of a fixed factor, there comes a point beyond which the additional output from additional units of the variable factor will eventually diminish
- 3 stages

    1. Increasing marginal output
        - Increasing positive gradient
        - More efficient labour-capital combination
            - Fixed capital used more effectively by adding more workers
        - Division and specialisation of labour => Greater efficiency
    2. Decreasing marginal output
        - Decreasing positive gradient
        - Inefficient labour-capital combination
            - Overcrowding arises
            - Fixed factor over-utilised
    3. Total output falls

        - Marginal output has decreased to the negative range
        - Decreasing negative gradient

Costs:

- Cost curves
    - AFC
        - Continuously downward sloping
    - AVC
        - U-shaped
        - Initially decreases due to increasing marginal returns

        - Subsequently increases due to law of diminishing marginal returns
    - ATC
        - U-shaped
        - ATC = AVC + AFC
    - MC
        - U-shaped (tick-shaped)
        - Same reasoning as AVC
    - Relationship
        - If MC > AVC/ATC, AVC/ATC will increase
        - If MC < AVC/ATC, AVC/ATC will decrease
        - MC curve intersects AVC/ATC curves at min points

Long Run
Production:

- Returns to scale
    - All inputs increased by the same proportion
- Increasing Returns to Scale
    - Output increases more than proportionately to the increase in inputs
    - Falling section of LRAC
    - Fall in average cost due to technical economies of scale
- Constant Returns to Scale
    - Output increases proportionately to increase in inputs
    - Horizontal section of LRAC
- Decreasing Returns to Scale
    - Output increases less than proportionately to increase in inputs
    - Rising section of LRAC
    - Rise in average cost due to technical diseconomies of scale

Costs:

- LRAC curve
    - U-shaped
    - Flatter than SRAC curve
    - Minimum Efficient Scale
        - The point where the LRAC stops falling
        - Optimal output level beyond which no further economies of scale can be achieved
        - Tells us the max number of firms of minimum efficient scale that a market can accomodate
            - Average cost of production set at MES
            - Output a single firm can produce (from MES)
            - Demand curve intersects average cost of production —> Output the market demands
            - Dividing the output the market demands by the output of a single firm gives the number of firms the industry can accommodate

Economies of Scale
Internal Economies of Scale (Shift along LRAC curve)

- Technical EOS
    - Factor Indivisibility
        - Some inputs are of a minimum size and are large and costly but can significantly increase output
        - These inputs can only be fully utilised in larger scale production
        - e.g. Expensive machinery
    - Law of Increased Dimensions
        - Larger containers more efficient
        - Increase in surface area results in a more than proportionate increase in volume
        - e.g. Oil tankers
    - Specialisation and Division of Labour
        - Workers can do simpler and more repetitive jobs
        - Less training required and more efficient workers
        - e.g. Car manufacturing
    - Linked Process Economies
        - Larger firms can integrate a number of vertically linked processes (vertical integration), saving time, transport costs and energy, reducing per unit costs
    - By-product economies
        - More economical use of materials
        - Supposed waste products could be used in the manufacture of by-products in larger plants
- Managerial EOS
    - Specialisation on a supervisory level
    - e.g. HR specialists raise productivity and reduce unit costs by creating efficient and cost effective hiring and human management processes
- Marketing EOS
    - Bargaining advantage and preferential treatment by suppliers when buying in bulk
    - Unit cost of supplies also lower as transportation does not increase at same rate as quantity
    - Advertising costs spread over larger volume of sales
- Financial EOS
    - Easier and cheaper to raise funds
        - Banks offer lower interest rates and larger loans to larger firms due to better credit ratings
        - Larger firms that are public limited companies can raise capital through issuance of bonds to the public
- R&D EOS
    - High initial capital outlay of R&D spread over greater output
    - Improvements in technology can lead to further falls in average costs
- Welfare EOS

    - Improving of working conditions increases efficiency of workers (greater output per worker)
- Risk-bearing EOS
    - Spreads uncertainty in costs of production over larger level of output
    - Producing wider variety of products reduces impact of shifts in DD of specific products on the entire firm
    - Operating in many geographic locations reduces impact of spikes in costs of raw materials in certain locations on the entire firm
    - Risk of R&D costs spread over wider range of activities
- Economies of Scope
    - Increase in types of products reduces AC of each product since overhead costs, managerial, marketing and financial EOS can be shared

<u>Internal Diseconomies of Scale (Shift along LRAC curve)</u>

- Complexity of Management
    - Principal-agent problem
    - Rigid organisational system resulting in loss of efficiency and higher costs
    - Extensive red tape slows down responses to changes in DD and SS conditions
- Strained Relationships
    - Relationships become impersonal
    - Workers have no personal loyalty to the firm, leading to sloppy work attitudes and apathy

<u>External Economies of Scale (Shift of LRAC curve)</u>

- Economies of Concentration
    - ↑ Availability of skilled labour as special educational institutions are set up to train people in the specific skills
    - Costs of well-developed infrastructure shared among all the firms in the area
    - ↑ Reputation of the industry in the area, encouraging brand loyalty e.g. Silicon Valley
- Economies of Disintegration
    - Subsidiary industries developed in the area to cater to the needs of the major industry
    - Subsidiary industries enjoy IEOS which translate to lower costs for the major industry
    - e.g. Seat belt industry to support main car industry
- Economies of Information
    - Research and expertise can be concentrated in a central research institution

<u>External Diseconomies of Scale (Shift of LRAC curve)</u>

- Increased strain on infrastructure when infrastructure is taxed to its limits
- Rising factor costs when there is a shortage

Growth of Firms

- Motives
    - Cost Incentives
        - Exploit available internal economies of scale by expansion of output/mergers (Technical/Managerial/Marketing EOS)
            - Lower unit costs
        - Greater economies of scale by expanding range of products and markets (Risk bearing EOS)
    - Revenue Incentives
        - Get bigger market share —> Market domination
            - Increase demand + demand for goods more price inelastic
            - Can force other firms out of the market to get even bigger market share
        - Increase market valuation
        - Reduce risk of takeover
- Methods
    - Internal expansion
        - Increase size by producing greater output/extending range of its product
        - Plough back profits
            - Part of profits retained in company for financing of future expansion programmes
        - Borrowing
        - Initial Public Offering
            - Raise capital from the public
            - Position the company for eventual expansion into national/international markets
    - Merger or Acquisition
        - Vertical Integration
            - Between firms engaged in different stages of a productive process
        - Horizontal Integration
            - A firm takes over a similar firm at the same stage of production
            - For market domination
                - Reduce competition
                - Increase market power
            - Conglomeration
                - Combination of firms not directly related to each other
                    - i.e. 1 large company split into smaller companies which deal in different industries
    - Franchising
        - Expansion by building chain stores to distribute goods
        - Supplier/franchisor alllows an operator/franchisee to use their trademark and distribute their goods in return for a fee
        - Operator has greater incentive than a direct employee

Existence of small firms

- Demand Factors
    - Large scale production not justified by the size of the market
    - Nature
        - Sale of perishables have small and localised markets
        - Preference for variety rather than mass production
        - Specialised products —> Limited markets
    - Prestige markets
        - Limited by price ⇒ Small DD
    - Personalised services
        - Individual attention needed —> Impossible to have mass production
    - Geographical limitations
        - Large in size when compared to value —> Transport costs relatively high compared to total production costs
        - Market for good likely to be local rather than national
            - Reduce transport costs
- Supply factors
    - *Reach MES at low levels of output
        - Diseconomies of scale occur at low levels of output ⇒ Disadvantage for big firms
        - Low fixed costs ⇒ Economies of scale quickly exhausted at low outputs and constant economies of scale over wide range of output (wide horizontal region of LRAC curve) ⇒ Coexistence of small and large firms
    - *Low BTE
        - Easy for small firms to set up
        - Due to low startup costs
    - Vertical disintegration
        - Production process broken into series of processes in which different small firms can perform each small part
    - Lack of capital
    - Unwillingness to take greater risks
        - Higher expenditure
        - Fear of future fall in price
    - Banding
        - Independent businesses work together to gain economies of scale (marketing)
    - Profit-cycles
        - Firms tend to be small in the early stages of a product cycle —> Take time to grow
    - Non-profit maximisation
        - People motivated by self-employment/prestige to start their own small businesses

Coexistence of Small and Large Firms

- Nature of LRAC curve
    - Economies of scale quickly exhausted at low outputs and constant economies of scale over wide range of output (wide horizontal region of industry's LRAC curve)
    - Possible for small and large firms to be equally cost efficient
- Market can be segmented
    - Industry caters to diversified range of products and customers
    - Small firms cater to niche markets
    - Large firms cater to mass production
- Production process can be disintegrated
    - Production separated into various stages
    - Small firms complement larger firms in same industry by specialising in a single process
- Joint ventures
    - Smaller firms set up jointly owned enterprises to enjoy same economies of scale as larger firms
- Technological process
    - New technology embedded in small scale equipment (favours small firms) rather than capital intensive (favours large firms)
    - Production process simplified—> Needs fewer and less bulky machines

Other Definitions:

Short run = A time period where there is at least one fixed factor of production
Long run = A time period where all factors of production can be varied, except the level of technology
Fixed factor = An input that cannot be increased in supply in the short run (usually capital/land)
Variable factor = An input that can be increased in supply in the short run (usually labour and raw materials)
Firm = Organisation or enterprise formed by entrepreneurs who bring togethers factors of production (land, labour, capital) to produce goods or services for sale
Plant = Physical location where factors of production are gathered for the purpose of producing goods or services
Industry = A group of firms that produce a single good or service, or a group of related goods or services
Production = Process by which factors of production are used to create goods and services
Production function = Mathematical relationship between output of a good/service and the factors of production used in producing them for a gien level oftechnology within a specific period of time
Explicit cost = Direct payments made to outside suppliers of inputs
Implicit cost = Costs which do not involve a direct payment of money to a third party but which involves a sacrifice of some alternative (Opportunity cost)
Accounting cost = Monetary value of explicit costs of production
Economic cost = Monetary value of explicit and implicit costs of production
Total cost = Sum of the costs of all factors of production

Average cost = Cost per unit of output
Overhead cost = Costs arising from the general running of an organisation and only indirectly related to the level of output
Market Share = The proportion of the firm's total sales in the market
Franchising = Practice of the right to use a firm's successful business model and brand for a prescribed period of time.

Sample Essay Questions
1a) Distinguish, with examples, between fixed costs, variable costs and marginal costs

- Definitions
    - Fixed Cost = The cost that does not vary with output level
    - Variable Cost = The cost that varies with output level
    - Marginal Cost = The cost incurred in producing an additional unit of output

1b) Discuss whether rising short run costs limit the size of firms over time

2a) Using appropriate examples, distinguish between internal and external economies of scale.

- Definitions
    - Internal economies of scale

2b) "Large firms have such overwhelming technical and financial advantages that the survival of small businesses is surprising." Discuss.

6) In 2001 there was a worldwide reduction in airline business. Smaller airlines with lower costs and cheaper discount fares suffered less than the high-cost larger airlines such as Air France, Swissair and Lufthansa.
a) Explain why, according to economic analysis, there are benefits from large scale organisations.
b) Discuss to what extent the above extract concerning costs disproves that economic analysis.