Chapter 5

The Behavior of Firms

This chapter focuses on how producers make decisions regarding supply. Individuals demand goods and services. Firms supply goods and services. An important assumption is that firms try to do one thing: maximize profits. They maximize profits similarly to how consumers maximize utility in that they use marginal analysis.

5.1 Weighing Costs and Benefits

1. Benefits

   - Total Benefit (TB) from using inputs in any given manner
   - Marginal Benefit (MB) is the additional benefit from the last unit of activity or last input

2. Cost

   - Total Cost (TC) of using inputs in a given manner
   - Marginal Cost (MC) is the additional cost from last unit of activity or last input used

3. Computing Maximum Net Gain

   (a) Method 1: Compute Net Gain and find maximum

   - NB = TB - TC

   - Choose inputs where NB is highest

   (b) Method 2: Equate MB to MC

   - Produce at point where MB=MC

   - If $MB > MC$, increase production

   - If $MC > MB$, decrease production

4. Equimarginal Principle

   - Activity pursued up to the point where MC=MB

   - Can be broadly applied to other areas (e.g., utility and consumer optimum)

5.2   Firms in the Marketplace

1. Total Revenue (TR) = Price (P) X Quantity (Q)

   - Price is the amount at which a good is sold

   - Quantity is the amount sold in the given period

2. Marginal Revenue (MR)

   - Additional revenue earned from last item produced and sold

   - Slope of TR

3. Fixed Costs (FC)

   - Costs that **do not** vary with quantity of output

- Example: rent is paid whether you double production or not

- Sunk cost - costs that cannot be avoided...irrelevant in economic decision making (already bought basketball tickets but want to go to concert)

4. Variable Costs (VC)

   - Costs that **do** vary with quantity of output

   - Example: worker's wages, utility bill, fuel

5. Increasing MC

   - Additional unit of an activity is more expensive than the last

6. Profit = TR - TC

7. Computing Maximum Profit (remember, this is what firms do)

   (a) Method 1: Compute Profits and find maximum

   (b) Method 2: Equate MR to MC

      - Produce at point where MR=MC

      - If $MR > MC$, profits can be increased by producing another unit...increase output

      - If $MC > MR$, profits will decrease by producing another unit...decrease output

8. Changes in Firm Behavior

   - Changes in FC have no impact in short run (remember, sunk costs)

      - If profits are negative, firm will eventually shut down and exit market (long run)

   - Changes in VC do impact firm behavior

- – TC curve shifts by different amounts at different quantities

- • Changes in MR do impact firm behavior

  - – Changes to Demand impact MR

Chapter 6

Production and Cost

This chapter focuses on deriving cost curves for firms in the short and long run.

6.1   Production and Costs in the Short Run

- Limited flexibility in the short run

- Fixed costs cannot be adjusted but variables costs can

- Firms can hire more labor but not purchase new capital

1. Total Product (TP) of Labor

   - Quantity of output produced by a firm in a given amount of time dependent on labor hired

   - Information is graphically represented by a production function

   - Production function is generally sloping upward

   - Determines how much output can be produced given a basket of inputs

2. Marginal Product of Labor (MPL)

    - Assume capital is fixed

    - Increase in TP based on hiring one more worker

3. Average Product of Labor (APL)

    - APL = TP / number of workers

4. Shape of MPL and APL curves

    - MPL and APL have inverted U-shape

    - If $MPL > APL$, MPL lies above APL

    - If $MPL < APL$, MPL lies below APL

    - If $MPL = APL$, APL is at a maximum or peak

5. Variable Cost in short run

    - Obtain TP curve

    - Obtain wage rate (price of hiring)

    - Multiply number of workers by wage rate to obtain variable cost

6. Fixed Costs in short run

    - Physical assets such as machinery and factories

    - Example: automobile

7. Total (TC) = FC + VC

8. Average Variable Cost (AVC) = VC / Q = wage rate / APL (since labor is only variable input)

9. Average Cost (AC) = TC / Q

10. Marginal Cost (MC) = wage rate / MPL (since labor is only variable input)

6.2 Production and costs in the Long Run

- Firms can adjust both labor and capital to acheive the least cost method of producing a given output

1. Isoquants

    - Describe the trade off between capital (K) and labor (L) for production

    - Assumptions

        - Slope downward

        - Fill the labor-capital plane

        - Never cross

        - Convex to origin

2. Marginal Rate of Technical Substitution

    - Absolute value of the slope of isoqant

    - Amount of K necessary to replace one unit of L while maintaing a constant level of output

    - MPL / MPK

3. Cost Minimization

    - Minimizing cost is necessary for maximizing profit

    - What combination of K,L will product a certain level of output at the lowest cost

    - Isocost and Isoquant are tangent where MRTS = P_L / P_K

4. Returns to Scale

- **Decreasing RTS** - When inputs increase by 1% and output increases by **less than** 1%

  - LRAC curve is decreasing

- **Constant RTS** - When inputs increase by 1% and output increases by **exactly** 1%

  - LRAC curve is flat

- **Increasing RTS** - When inputs increase by 1% and output increases by **more than** 1%

  - LRAC curve is increasing

6.3   Relations Between SR and LR

- Derive SRTC from isoquants and factor prices

- Derive LRTC from isoquants and factor prices

- SRTC $\geq$ LRTC

- Multitude of SR situations

  - Each has a different level of capital

  - True for TC and AC

  - Each point on LR curve is associated with a tangency point from a SR curve

Chapter 7

Competition

This chapter focuses how decisions are made by perfectly competitive firms in both the long and short run. While most markets are not perfectly competitive markets (and we will study them in the final part of the class), this section provides the foundation for price and output determination as well as entry/exit decisions for firms.

7.1 The Perfectly Competitive Firm

- What consitutes a perfectly competitive firm?

    - Firms are price-takers and have no pricing power

    - Products are homogenous (interchangeable) - no product differentiation

    - Firms are relatively small and cannot impact market

    - Buyers can easily buy from other producers at little or no cost

    - Market Entry/Exit is free

1. Revenue

- $TR = P \times Q$

- For a price-taker, $P \equiv MR$

- MR curve is flat (conincides with Demand curve facing a perfectly competitive firm)

2. Firm's Supply Decision

  - Remember, the Golden Rule is to produce where $MR = MC$

  - Perfectly competitive firm produces where $P = MC$, since $P \equiv MR$

  - Supply curve is the upward sloping portion of MC curve

3. Shutdowns versus Exits

  - **Shutdown**: Firm stops producing good in the **short run** but still pays fixed costs

  - **Exit**: Firm leaves the industry entirely and no longer faces any costs (**long run**)

  - In Short run, firms can shutdown but cannot exit

  - Firms will no shutdown as long as $P > AVC$

  - Firms will shutdown when $P < AVC$

  - In long run, firms can exit (cannot in the short run)

4. Short run Supply Curve

  - In SR, supply curve is identical to SRMC curve above AVC

  - If $P < AVC$ output is zero since firm will shut down

  - Supply curve is upward sloping

    - AC and MC have U-shape

    - Diminishing marginal returns to variable factors of production

5. Elasticity of Supply

- Percent change in quantity supplied resulting from a 1% change in price

7.2 The Competitive Industry in the Short Run

- More Assumptions

  - All firms in industry are competitive

  - **Short run** - Period of time in which no firm can exit/enter the market

  - Number of firms cannot change in short run

  - In long run, any firm can enter or exit the industry

  - Industry SR supply curve

    * Sum of all individual supply curves

    * More elastic (flatter) than individual supply curves

1. Supply, Demand, and Equilibrium

- Each firm operates where supply (or MC) meets demand (horizontal line)

- Industry equilibrium consequence of optimizing behavior on part of firms and individuals

- Industry price occurs where industry demand equals industry supply

2. Change in Fixed Cost

- Example: Rental rates or interest rates increase

- Price and quantity remain unchanged in short run

- MC and Demand are not impacted

3. An Increase in Variable Cost

  - Increases firm MC curve

  - Causes some firms to shutdown (remember shutdown condition is $P < AVC$

  - Other firms produce less

  - Quantity supplied is reduced in industry

  - Higher market equilibrium price

  - Higher price induces increase in output for firms who do not exit

  - Firm-level output is ambiguous

4. Increase in Industry Demand

  - Example: What you produce becomes a fad or healthier

  - Increased demand leads to industry price increase

  - Firms increase output when they equate $P = MC$

7.3   The Competitive Firm in the Long Run

- Some fixed costs in the short run become variable costs in the long run (e.g., capital)

- Firms can costlessly enter or exit in the long run

1. Profit and Exit Decision

  - Profit = TR - TC (Costs include all foregone opportunities)

  - LR supply curve is more elastic than SR supply curve

- – In SR, firm shuts down if $P < AVC$

- – In LR, firm exists when $P < AC$

2. Long Run Output Decision

  - Firms operate where $P = LRMC$

  - LRMC curve is identical to LR supply curve

7.4   The Competitive Industry in the Long Run

- Firms wishing to enter or exit the market do so in the LR

- Link between entry and exit and industrys LR supply curve

- LR competitive equilibrium

1. Zero Profit Condition

  - All firms earn zero economic profits in the LR

  - Produce at the lowest possible AC

  - Economic cost versus accounting cost

2. Industry LR Supply Curve

  - All firms are identical

  - Industry supply curve is flat at the break-even price

  - More on break-even price and LR supply

    - – Break even price $(P = AC)$ at which seller earns zero economic profits

    - – If $P > AC$ then firms earn a positive profit, enticing new entrants

    - – If $P < AC$ then firms earn negative profits, enticing firms to exit industry

3. Flat LR supply curve

  - Flatness based on entry and exit

  - If $P < AC$ then all firms exit

  - If $P > Ac$ then unlimited number of firms enter

  - LR zero profit equilibrium almost never reached

    – Demand and cost curves shift so often that entry and exit never settles down

    – Approximation or limit

4. A Rise in variable costs

5. Relaxing Some Assumptions

  (a) All firms are identical and have identical cost curves

    - True in industries that require skills that are not unusual

  (b) Cost curves do not change as industry expands or contracts

    - True in industries that are too small to influence the market price

  (c) Without these assumptions, all firms do not have the same break even price

6. Constant Cost Industry

  - An industry which experiences no change to average costs when industry output increases

    – When an increase in demand results in an increase in price and new entrants into an industry, the LRAC curve is not impacted

    – The result of a horizontal long-run industry cost curve

  - Satisfies assumptions for perfectly competitive industry

7. Increasing Cost Industry

- Break even price for new entrants increase as industry expands

  – Violated: All firms are not identical since less productive ones enter market later

  – Violated: Cost curves change due to factor-price effect

- Long run supply curve is upward sloping

8. Decreasing Cost Industry

- Break even price for new entrants decrease as industry expands

- Long run supply curve is downward sloping

9. Three Examples

- Removing a rent control

- A tax on motel rooms

- Tipping the busboy