3.2 Lecture 6: From Production to Costs

3.2.1 Short run costs

- **Fixed costs** are the costs of inputs that can't be varied in the short run.
  - In this course, we usually assign capital as fixed costs.
- **Variable costs** are the costs of inputs that can be varied in the short run.
  - In this course, we usually assign labor as variable costs.
- **Total costs** are the sum of fixed and variable cost: $C = F + VC$.
- **Marginal costs** are the change in costs for another unit of output:

$$MC = \frac{\Delta C}{\Delta q}.$$

  In the short run, marginal cost is just the change in variable costs.
- **Average costs** are the average cost of production per unit produced.

$$AC = \frac{C}{q}$$

$$AVC = \frac{VC}{q}$$

$$AFC = \frac{FC}{q}$$

- Graphically, marginal cost is constant upward slope, average fixed cost is steadily declining, average variable cost is rising but more slowly than marginal cost, average total cost is first declining then rising. Note that where the average costs are at a minimum is where they cross the marginal cost curve.
- **Sunk costs** are costs that cannot be recovered through any change in production patterns. Sunk costs cannot be recovered and should not affect future production decisions.

3.2.2 Long run costs

- Recall that in the long run, all input costs are variable. So choice is over input mix to maximizes production efficiency, or minimizes costs.
- **Isocost line** is the combination of capital and labor that yield the same total level of costs. Total costs is

$$C = rK + wL.$$

- Firms choose economically efficient combination of inputs for a given level of output.
- Cost minimization is achieved when isoquant $f(L, K)$ is tangent to isocost $C = wL + rK$:
$$\frac{MP_L}{MP_K} = \frac{w}{r} \Rightarrow \frac{MP_L}{w} = \frac{MP_K}{r}.$$
Economically efficient point is where the last dollar spent on labor adds as much to output as the last dollar spent on capital.
- **Expansion path** traces cost-minimizing (K, L) combinations for all output levels.

3.2.3 Economic and accounting profits

- **Accounting profits** measure only cash inflows of revenues and outflows of costs
- **Economic profit** also accounts for opportunity costs that aren't necessarily paid in cash

3.2.4 TO KNOW – Conceptual Understanding

- Identify the definition of fixed costs, variable costs, and sunk costs
- Know the difference between short run and long run production. In the short run, at least one input (capital) is fixed. In the long run, all inputs are variable
- Explain why average costs are at a minimum when they cross the marginal cost curve
- Firms choose input combinations to produce a given output at lowest cost

3.2.5 TO KNOW – Graphical and Math Understanding

- Derive different cost functions: total costs, fixed costs, variable costs, marginal costs, average costs
- Know the shape characteristics of AFC, AVC, MC in a graph
- Show graphically in the isoquant–isocost diagram how to yield the cost-minimizing (L, K)