Review Notes – Cost Minimization and Cost Curves

- Cost Minimization
  - The cost function
    - Costs come from profit maximization. How?
      1. Problem is to minimize costs = wL + rK subject to Y = f(L,K).
  - Graphically
    - Use equation 1 above, which implies must use isoquants.
    - Define isocost curve = combinations of L and K such that costs are constant.
    - What are the intercepts on isocost curve?
    - What is the slope of the isocost curve?
    - How many isocost curves are there?
  - Minimizing Costs graphically and mathematically
    - Again, requires a tangency between two curves => slopes are equal.
    - Or MP_L/MP_K = w/r or MP_L/w = MP_K/r – do these look familiar?
    - Derive the conditional factor demand curves or the derived factor demand curves from this requirement.
      - K* = f(Y*,w,r); L* = f(Y*,w,r).
      - How do K* and L* change as Y*, w, and r change?
- Revealed Cost Minimization
  - What’s that?
  - Definition/equations – WACM – Weak Axiom of Cost Minimization
    - Implications of WACM with respect to:
      - Firm Demand for the inputs
- Returns to Scale and Cost Minimization
  - Increasing returns to scale => what happens to LRAC as output increases? => Economies of Scale
  - Decreasing returns to scale => what happens to LRAC as output increases? => Diseconomies of Scale
  - Constant returns to scale => what happens to LRAC as output increases?
  - Graphically
- Short-run Cost Minimization
  - Assume L is variable and K fixed => K* = fixed K; L* = f(fixed K, Y*, L)
  - Note that cost curves in short-run are also defined with K fixed

- Cost Curves
  - Short-run Cost Curves
    - Define total costs: C(Y) = C_s(Y) + F or TC = TVC + TFC.
      - What do the cost curves look like graphically?
• Define average costs: $AC(Y) = \frac{C_v(Y)}{Y}$; $AVC(Y) = \frac{C_v(Y)}{Y}$; $AFC(Y) = \frac{F}{Y}$ or $AC(Y) = AVC(Y) + AFC(Y)$.
  •  What do the cost curves look like graphically?
• Define marginal costs: $MC(Y) = \frac{\Delta C(Y)}{\Delta Y} = \frac{\Delta C_v(Y)}{\Delta Y}$. Why?
•  What is the relationship between the cost curves graphically and mathematically?

### Long-run Cost Curves

• Important points
  1. All inputs are variable $\Rightarrow$ costs associated with different plant sizes or scale of operations.
  2. Once $K$ is chosen in the long-run $\Rightarrow$ $K$ becomes fixed in the short-run $\Rightarrow$ $K$ is not chosen optimally in the short-run.

• What is the relationship between short-run AC curves and long-run AC curves?
  • You should know this graphically and mathematically.
  • For a given $Y$ $\Rightarrow$ if $K$ is chosen optimally in s-r and l-r $\Rightarrow$ $AC_{sr} = AC_{lr}$
  • However, if in s-r move away from this $Y$ $\Rightarrow$ $K$ is not chosen optimally and $\Rightarrow$ $AC_{sr} > AC_{lr}$ $\Rightarrow$ LRAC is the lower envelope of all SRAC curves.
  • What does this look like graphically?