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

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- Cost Curves
  - Short-run Cost Curves
    - Define total costs: $C(Y) = C_v(Y) + F$ or TC = TVC + TFC.
      - What do the cost curves look like graphically?

- Define average costs: $AC(Y) = C_v(Y)/Y$; $AVC(Y)=C_v(Y)/Y$; $AFC(Y) = F/Y$ or $AC(Y) = AVC(Y) + AFC(Y)$.
  - What do the cost curves look like graphically?
- Define marginal costs: $MC(Y) = \Delta C(Y)/\Delta Y = \Delta C_v(Y)/\Delta Y$. Why?
- What is the relationship between the cost curves graphically and mathematically?

▪ Long-run Cost Curves
- Important points
  1. All inputs are variable => costs associated with different plant sizes or scale of operations.
  2. Once K is chosen in the long-run => K becomes fixed in the short-run => K is <u>not</u> 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 => if K is chosen optimally in s-r and l-r => $AC_{sr} = AC_{lr}$
  - However, if in s-r move away from this Y => K is not chosen optimally and => $AC_{sr} > AC_{lr}$ => LRAC is the lower envelope of all SRAC curves.
  - What does this look like graphically?
