

Cost of Production

- Economic cost vs. accounting cost
 - Economists count the cost of **lost opportunity**
- Cost definitions
 - Sunk costs - expenditure that has already been made and cannot be changed
 - Total costs = Fixed Costs + Variable Costs
 - $TC = FC + VC$
 - Fixed costs – invariant with level of output, cannot be changed in SR
 - Variable costs – depend on level of output

- Marginal cost (MC) – additional cost with an additional unit of output
- Average cost – total cost per unit of *output* ($ATC=TC/Q$)
- Also:
 - Average fixed cost: $AFC=FC/Q$
 - Average Variable cost: $AVC=VC/Q$
- How is MC related to MP_L ?

Cost of Production

- $TC = rK + wL$
- Where w = “wage”
- Where r = “rental rate on capital”
 - Includes interest and depreciation
 - E.g. buy machine for \$1million
 - depreciate (straight-line) for 10 years
 - Pay 12% interest
 - Why 12?
 - In general, cost of capital depends on interest rates, depreciation, taxes, and my risk

Isocost Lines

- $TC = rK + wL$
- Intercept, slope: $K = (TC/r) - (w/r)L$
- See total cost, slope in diagram

Cost Minimizing Input Choice

- The firm seeks to produce at minimum cost
 - Finds the “lowest” isocost that achieves any production isoquant

- At choice, slope of isocost=slope of isoquant
- At choice, $MRTS=(w/r)$
- LR or SR?

Input Choice with Math

- Choose K and L to minimize $wL+rK$ s.t.
 $q=F(K,L)$
- $L = wL + rK + \lambda[q-F(K,L)]$

- (1) and (2) illustrate tangency
- Solve (1), (2), and (3) for “input demand functions”
 - How much K and L to use to produce given level of output with minimum cost, for combinations of w and r .

Input Demand Example

- $q = K^a L^b$; Find $L^*(w, r, q)$, $K^*(w, r, q)$

Total Cost Graphically

- Find optimal (K,L) combinations for producing, say, $Q=1,2,3,4$
 - Find cost

- So, in Cost-Quantity space:

Cost Graphical Example

- Producing in US vs. Mexico
 - Assume $r_{US} = r_M$, $w_{US} > w_M$.
- Compare TC in both places

- Can we compare costs?

Cost in LR & SR

- Find LR input choices and costs
- Show LRTC
- Fix K
- Show SRTC

SRTC – “Usual Shape”

- Shape of SRTC is governed by the marginal product of labor

- At A, SRTC has minimum slope \Rightarrow min. MC
- At B, slope of SRTC = slope of ray from FC
 - \Rightarrow MC = min. AVC
- At C, slope of SRTC = slope of ray from origin
 - \Rightarrow MC = min. ATC

Long Run Costs

- Governed by scale
- “Usual shape”