

PRODUCTION AND FIRMS – PART 2

SOME CONCEPTUAL DISTINCTIONS OF COSTS (P-R pp. 213-8)

1. ECONOMIC VERSUS ACCOUNTING COSTS

Accounting costs include actual transactions – interest, IRS-formula depreciation, ...

Purpose is descriptive – monitoring on behalf of shareholders etc.

Economic costs are opportunity costs – purpose is to help decision-making, prescriptive

1. A machine or building fully owned by a firm still has an opportunity cost

2. Sunk costs (unavoidable commitments) are not opportunity costs

The decision whether to make such a commitment should take its cost into consideration but once it is made, the cost is not relevant for subsequent decisions

2. FIXED VERSUS SUNK

Fixed – Independent of the (positive) level of output, but can be avoided if produce zero

Sunk – Independent of the level of output, and cannot be avoided even if produce zero

Usually because of contractual commitments that must be honored

Better labels would be “Fixed but not sunk” and “Fixed and sunk”

3. SHORT RUN VERSUS LONG RUN

Different degree of variability of different inputs; longer time implies fewer costs are sunk

Expository device - capital is fixed in short run, labor variable in short run

TWO INPUTS – COST MINIMIZATION (P-R pp. 226-32)

For any assigned output target level Q

Minimize $wL + rK$ subject to $F(K,L) = Q$

Figure shows isoquant, and isocost lines

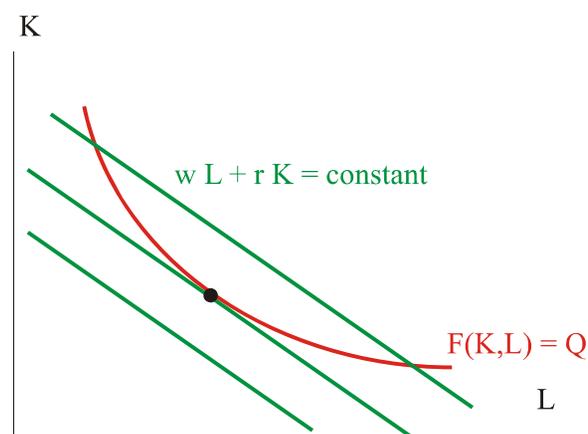
Slope of isoquant at each point

= MRTS at that point

Expression for MRTS: MP_L / MP_K

Constant slope of isocost lines =

w / r in numerical value



Condition for cost-min: $MRTS = w/r$

So $MP_L / MP_K = w / r$, or $MP_L / w = MP_K / r$, or $w / MP_L = r / MP_K$

Interpretation – To produce 1 more unit of output, need

Either $1 / MP_L$ more labor at cost w / MP_L

Or $1 / MP_K$ more capital at cost r / MP_K

or some mixture. When optimal choice made, these two must be equal, each = MC

If we solve cost-min by Lagrange's method, will find Lagrange multiplier = MC

Example – Cobb-Douglas, $Q = A K^\alpha L^\beta$. Remember $MRTS = (\beta K) / (\alpha L)$

So cost-min condition $(\beta K) / (\alpha L) = w/r$, or $\beta (rK) = \alpha (wL)$, or $rK / \alpha = wL / \beta$

Empirical approximation for aggregate production function for whole economy has

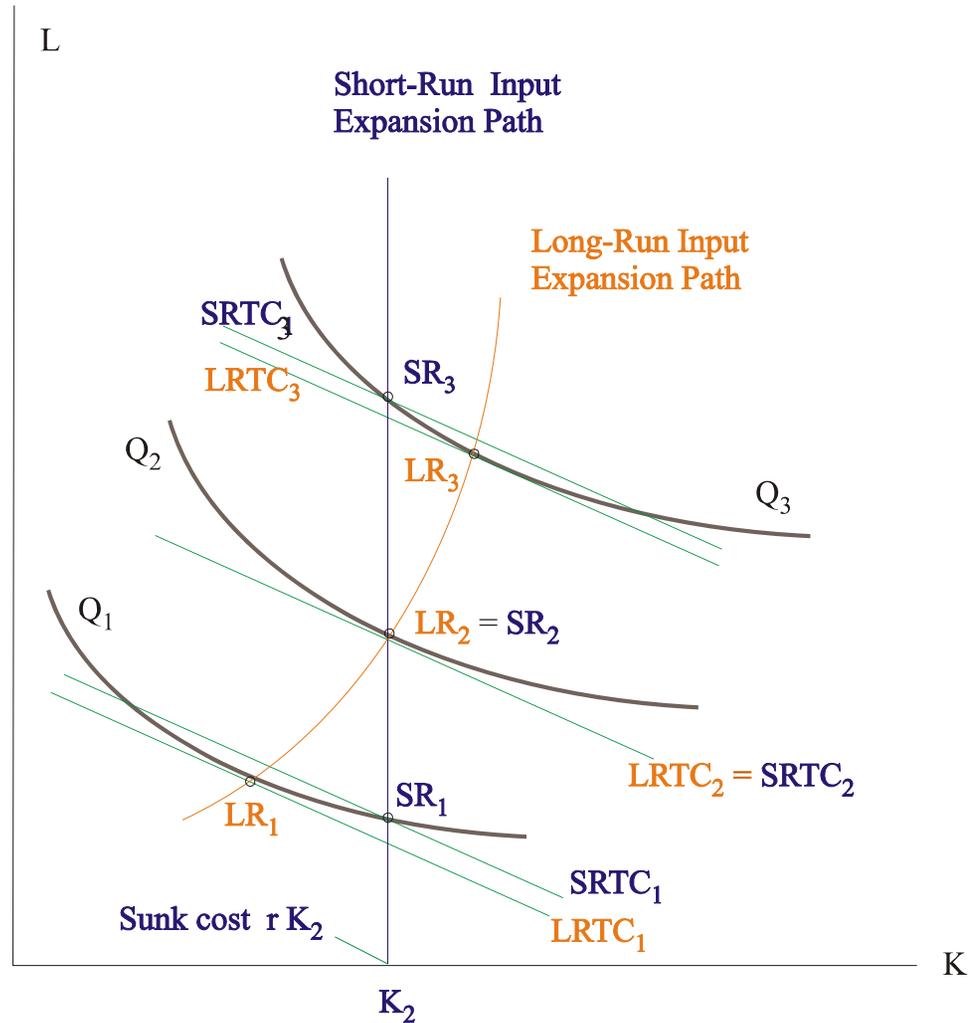
$\alpha \approx 0.3$, $\beta \approx 0.7$, so these are approx. shares of capital and labor in total income

COST FUNCTION $C(Q)$ (P-R pp. 232-5)

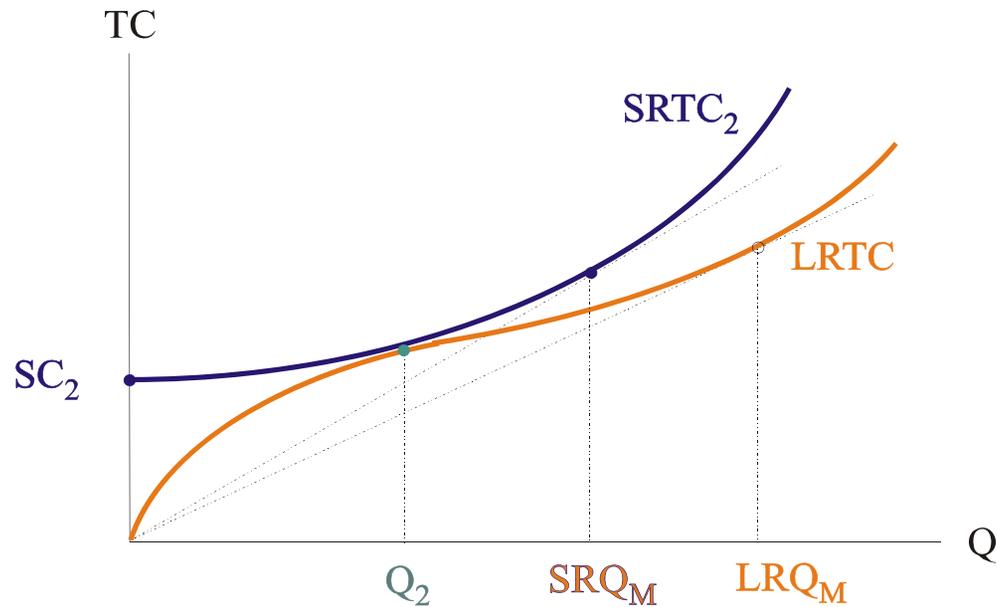
Can do the above calculation for each Q ;
 this yields whole cost function $C(Q)$
 Short run (capital K cannot be altered,
 its costs are sunk)
 versus long run (no costs sunk, K and L
 can both be chosen optimally)

In Figure, $K = K_2$ just happens to be
 optimal for producing $Q = Q_2$
 When $Q = Q_1$, would like smaller K
 when $Q = Q_3$, would like larger K
 Inability to change K in short run
 Short run cost > long run cost
 in both those situations

Hence $SRTC$ lies above $LRTC$
 and $SRAC$ lies above $LRAC$
 except for coinciding at Q_2

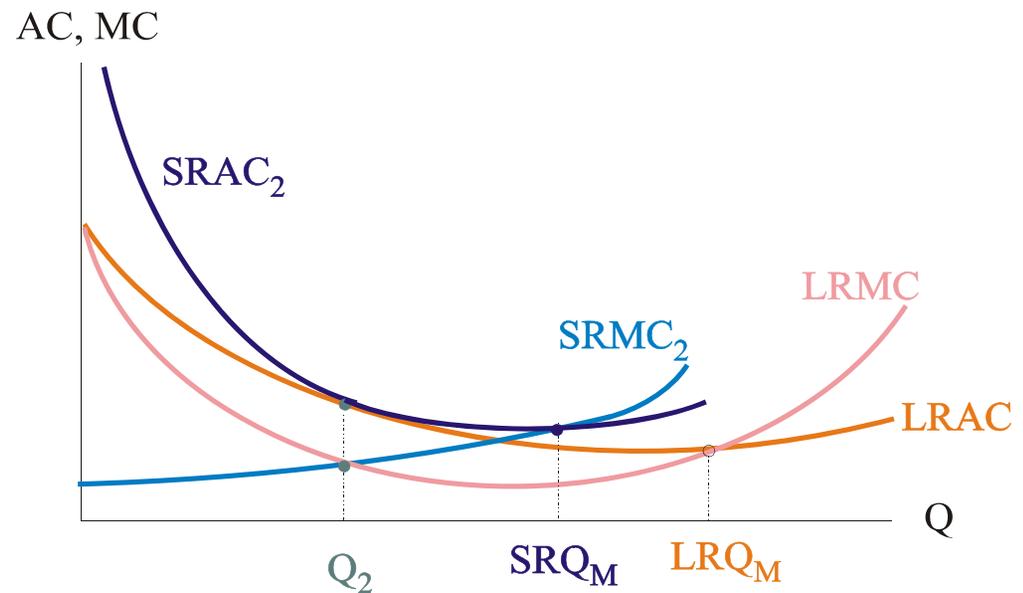


Example shown in Figure:
 Most labels are standard,
 except SC = sunk cost
 Subscript M stands for the
 AC-minimizing quantity
 Note that $SRQ_M > Q_2$;
 even in SR, there may be
 scale economies beyond Q_2
 In long run, even more,
 because K can be varied



More complex picture
 of this kind, showing points
 to the right of LRQ_M also,
 is in P-R p. 239
 However, they do not do
 a good job of distinguishing
 between fixed and sunk

A more complete picture
 is on the next page



GENERAL PICTURE OF ONE FIRM'S COST CURVES: NOTATION

TC = total cost

FC = fixed cost (does not vary as output Q varies but stays > 0)

FSC = fixed and sunk cost (unavoidable even if Q = 0)

FAC = fixed but avoidable (not sunk) cost (can be avoided if Q = 0)

TVC = total variable cost

TAC = total avoidable cost

$$TC = FC + TVC$$

$$FC = FSC + FAC$$

$$TC = FSC + TAC$$

$$TAC + FSC = TC = FC + TVC = FSC + FAC + TVC$$

$$TAC = TVC + FAC$$

AC = TC / Q = average cost (P-R call this "average total cost" ATC but that can be confusing)

AVC = TVC / Q = average variable cost

AAC = TAC / Q = average avoidable cost (AAC is P-R's "average economic cost" on p. 270)

$$AAC = (TVC + FAC) / Q = AVC + FAC / Q \text{ (therefore } AAC > AVC)$$

$$AC = AVC + FC / Q$$

$$AC = AAC + FSC / Q$$

MC = marginal cost, passes through the min of all of AC, AAC, AVC

S = short-run supply curve of a price-taking firm: coincides with MC above point of min AAC

