Microeconomics

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The Theory of the Firm and Market Structure: Costs

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- Assume again that capital use is fixed in the short run in the production function Q = F(K, L)

Definition

Fixed cost (FC) – cost that does not vary with the level of output in the short run (the cost of all fixed factors of production).

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 Other examples: property taxes, insurance payments, interest on loans, overheads etc.

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Definition

Total cost (TC) – all costs of production: the sum of variable cost and fixed cost.

In our example:

$$TC_{Q_1} = VC_{Q_1} + FC = wL_1 + rK_0$$

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Definition

Average Fixed Cost (AFC) – fixed cost divided by the quantity of output:

$$AFC_{Q_1} = rac{FC}{Q_1}$$

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Average Variable Cost (AVC) – variable cost divided by the quantity of output:

$$AVC_{Q_1} = \frac{VC_{Q_1}}{Q_1}$$

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Definition

Average Total Cost (ATC) – total cost divided by the quantity of output:

$$ATC_{Q_1} = \frac{TC_{Q_1}}{Q_1} = \frac{FC + VC_{Q_1}}{Q_1}$$

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Definition

Marginal Cost (MC) change in total cost that results from a 1-unit change in output:

$$MC_{Q_1} = rac{\Delta TC_{Q_1}}{\Delta Q} = rac{\Delta VC_{Q_1}}{\Delta Q_1}$$

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Short-run Average and Marginal Cost Curves I

Typical cost curves:



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Short-run Average and Marginal Cost Curves II

Typical marginal and average cost curves:



When MC is less than average cost, the average cost curve must be decreasing.

When MC is greater than average cost, average cost must be increasing.

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Short-run Average and Marginal Cost Curves III

In case of constant Marginal Cost:



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The Relationship among MP, AP, MC and AVC I

Recall:

$$MC = \frac{\Delta VC}{\Delta Q} = \frac{\Delta wL}{\Delta Q}$$

■ If we keep *w* fixed we have:

$$MC = \frac{w\Delta L}{\Delta Q} = \frac{w}{MP_L}$$

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The Relationship among MP, AP, MC and AVC II

Relation between Cost and Productivity Curves:



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Costs in the Long Run I

Definition

Isocost line – a set of input bundles each of which costs the same amount.



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Costs in the Long Run II

Maximum Output for a Given Cost:



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Costs in the Long Run III

Minimum Cost of a Given Output:



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Optimal Choice

• At the point of tangency we have:

or

$$\frac{MP_{L^*}}{w} = \frac{MP_{K^*}}{r}$$

 $MRTS = \frac{MP_{L^*}}{MP_{K^*}} = \frac{w}{r}$

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Optimal Choice

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$$\frac{MP_{L^*}}{w} = \frac{MP_{K^*}}{r}$$

When costs are at a minimum, the extra output we get from the last unit of money spent on an input must be the same for all inputs:

$$\frac{MP_{X_1}}{P_{X_1}} = \frac{MP_{X_2}}{P_{X_2}} = \dots = \frac{MP_{X_n}}{P_{X_n}}$$

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Applications I

Why some goods are produced in poor countries?



Applications II

The effect of minimum wages:



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Long Run Cost Curves I

Analogously to the short run case we have:

$$LMC_Q = rac{\Delta LTC_Q}{\Delta Q}$$
 and $LAC_Q = rac{LTC_Q}{Q}$

With constant returns to scale:



Long Run Cost Curves II

With decreasing returns to scale:



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Long Run Cost Curves III

With increasing returns to scale:



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Cost Curves and Market Structure I

Highly concentrated markets:



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Cost Curves and Market Structure I

Unconcentrated markets:



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