

Name of the course :- MA PART I (ECONOMICS)

Paper :- I

TOPIC - LONG RUN COST & why is the LAC curve U shaped?

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### LONG RUN COST

Long run is a planning period, and long run cost is the cost behaviour during the planning period. In the long run, a firm has the option of changing all the inputs. The firm has the option of shifting from one scale to another scale of production.

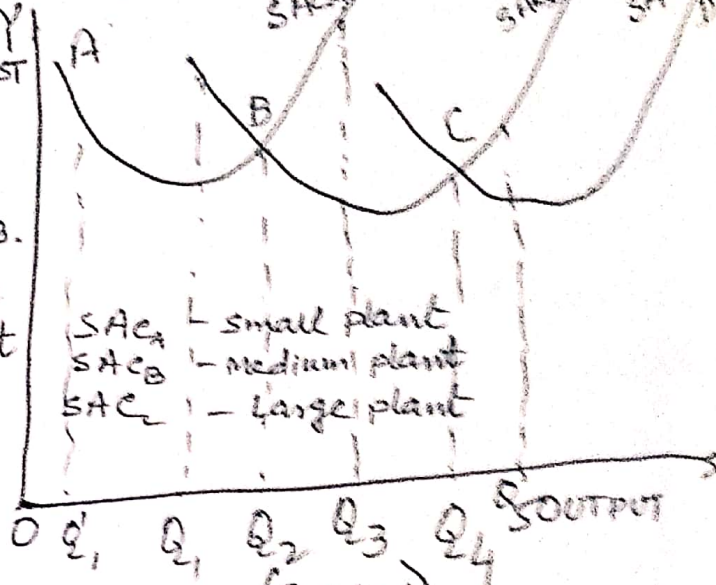
Suppose the firm has the option to choose any one of the three plants A, B and C. All plants can produce output upto 300 units. But every plant cannot produce every level of output at the same per unit cost. Suppose A can produce 100 units at a lower cost than B and C. Plant B can produce 200 units cheapest, and plant C can produce 300 units cheapest. If the firm plans to produce 200 units, it must choose plant B. The choice is available only in the long run. Once the choice is made and production started, no further choice is there so long as the firm is in the short run.

Long run cost is a chart showing levels of output and the lowest cost at which each of the level can be produced and the plant associated with it. The chart is prepared by selecting the lowest cost output from each plant, with higher cost options ignored. Each plant has a cost behaviour which is a short run behaviour. Long run cost behaviour is simply the collection of the best parts of the short run behaviour.

# Derivation of the LAC curve:

LAC curve is curved out by selecting the cost economical ~~plants~~ points from the short Run Average cost (SAC). Suppose the choice is limited to only three plants A, B and C. Each plant has different SAC (figure 3.1)

Given three SACs, output  $Q_1$  can be produced cheapest by using plant A. Output  $Q_2$  can be produced cheapest both from A and B.  $Q_3$  can be produced cheapest by using B. It means that any output lower than  $Q_2$  has lower cost if plant A is used. Similarly output greater than  $Q_2$  but lower than  $Q_4$  can be produced



cheapest by using plant B. Also, any output higher than  $Q_4$  is produced cheapest with plant C.

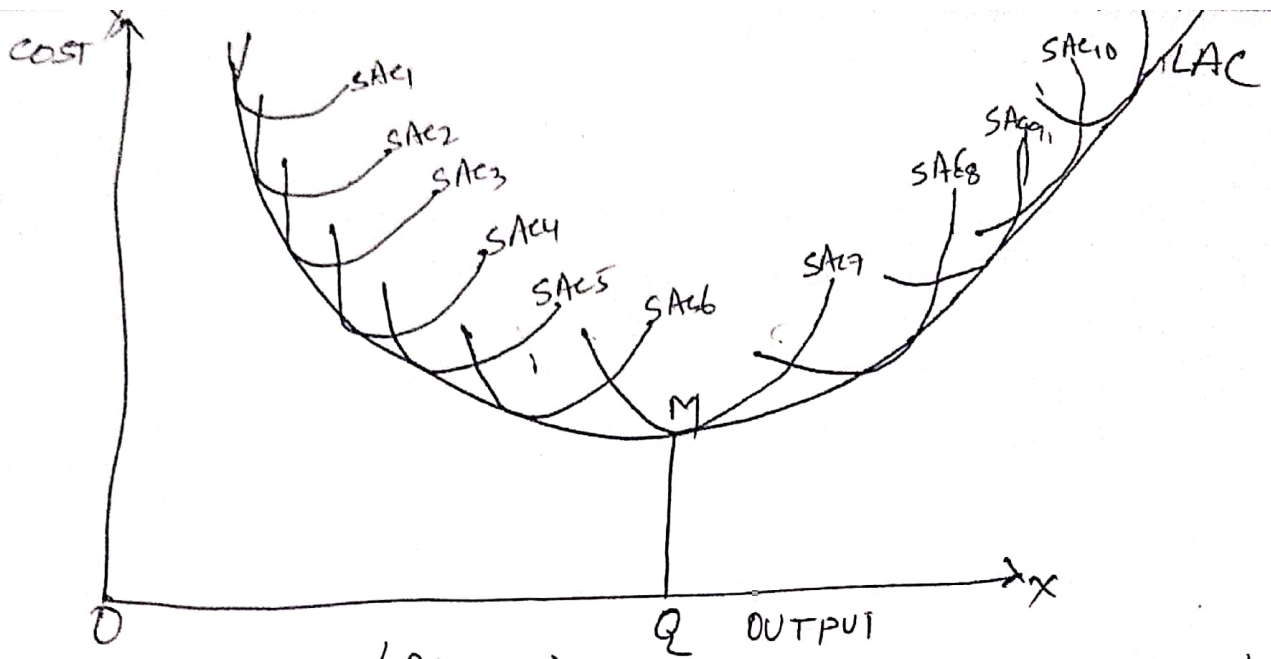
If the firm plans to produce output  $Q_1$ , it will choose small plant ( $SAC_A$ ). If the firm plans to produce  $Q_3$  it will choose medium plant ( $SAC_B$ ). If it wishes to produce  $Q_5$  it will choose the large size plant ( $SAC_C$ ). If the firm starts with the small plant ( $SAC_A$ ) and its demand gradually increases, it will produce at lower cost (up to level  $Q_1$ ). Beyond that point costs start increasing. If its demand reaches the level  $Q_2$  the firm can either continue to produce with the small plant or it can install the medium-size plant. The decision at this point depends not on costs but on the firm's expectations about future demand. If the firm expects that the demand will <sup>expand</sup> further than  $Q_2$ , it will install the medium plant, because with the plant output larger than  $Q_2$  are produced with a lower cost.

Similar conditions hold for the decision of the firm when it reaches the level  $Q_4$ . If it expects its demand to stay constant at this level, the firm will not install the large plant, given that it involves a large investment which is profitable only if demand expands beyond  $Q_4$ .

All these cost economical positions of the SACs lie below the intersections B and C. By joining these we get LAC. ABCD is the LAC curve derived from the SACs. The positions above the intersections are left out because they are costlier.

Note that derived LAC curve is not a smooth U shaped. It is wavy. It is so because the choice is limited to only three plants. As we relax the assumptions of the existence of only 3 plants and assume that available technology includes many plant sizes each suitable for certain level of output, the points of intersection of consecutive plants are more numerous. In the limit, if we assume that there is a very large number of plants, we obtain a continuous curve, which is the planning LAC curve of the firm. Each point of this curve shows the minimum/optimal cost for producing the corresponding level of output. The LAC curve is the locus of points denoting the least cost of producing corresponding output. It is a planning curve because on the basis of this curve the firm decides what plant to set up in order to produce optimally (at minimum cost) the expected level of output.

In the traditional theory of the firm the LAC curve is U-shaped and it is often called the 'envelop curve' because it 'envelops' the SRC curves (Fig 3.2)



(Fig 3.2)

The choice is assumed to be so wide that only one output level is chosen from each plant. This is why the LAC curve is taken as the locus of only tangency points of SAC and LAC.

But all the tangency points are not the minimum SAC points. Only at M, the minimum SAC coincides with the minimum LAC. Before M the LAC & the SAC curves are tangent at their downward sloping points, just left to the minimum. After M, they are tangent at the rising positions.

Let us examine U shape of the LAC. The shape reflects the laws of returns to scale. According to these laws the unit costs of production decrease as plant size increases, due to the economies of scale which the larger plant sizes make possible.

Economies mean less and less per unit cost as output increases. Diseconomies mean more and more per unit cost as output increases.

Economies can be 'internal' or 'external'.

Internal economies arise on account of expansion of output by the firm itself. External economies arise due to expansion of whole industry.

Internal economies are similar to returns to scale. They arise due to higher degree of specialisation, and the benefits arising from the bigger dimension inputs. Internal diseconomies arise from managerial diseconomies. As firm expands, management is overworked & complex. External economies arise due to expansion of technical knowledge, cheaper inputs, growth of ancillary industries, availability of skilled labour, cheaper marketing, cheaper transport. External diseconomies arise on account of rise in prices of inputs, higher wage rate & expansion of industry etc.