

## Long-Run Average Cost Curves

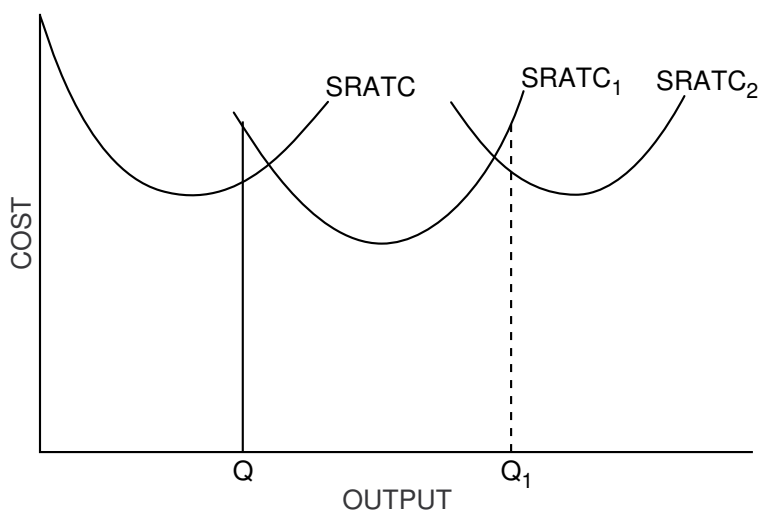
The cost curves that we used in previous activities are short-run cost curves. In the short run, firms can vary output but not plant capacity. Here, we turn to the long run, defined as a time period in which the firm can vary its plant capacity and its output. In the short run, the shapes of the average and marginal cost curves result from diminishing marginal productivity of the resources. In the long run, the shape of the average cost curve results from economies and diseconomies of scale. Sources of economies of scale are specialization of resources, more efficient uses of equipment, a reduction in per-unit costs of factor inputs, an effective use of production by-products and an increase in shared facilities. Sources of diseconomies of scale are limitations on management decision making and competition for factor inputs.

### Part A

Use Figure 30.1 to answer the following questions.



Figure 30.1  
Long-Run Average Total Cost Curves



1. What does each of the short-run ATC curves represent?
2. The firm can minimize costs by producing output level  $Q$  using firm size \_\_\_\_\_. This means that it would be (*underutilizing / overutilizing*) plant size ( $SRATC / SRATC_1$ ).
3. Label the optimal output level in the diagram as  $Q_{LR}$ .

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4. To produce output level  $Q_1$ , the firm should use plant size \_\_\_\_\_. This means that it would be (*underutilizing / overutilizing*) plant size ( $SRATC_1 / SRATC_2$ ).
5. Draw in the long-run average total cost curve and indicate its tangency points with each short-run ATC curve. Label the curve LRATC.
6. The firm experiences (*economies / diseconomies*) of scale up to output level \_\_\_\_\_ and (*economies / diseconomies*) of scale beyond output level \_\_\_\_\_.

### Part B

7. In the space below, draw the long-run average total cost curve for a firm experiencing constant returns to scale. Explain your diagram. Give an example of a type of firm that experiences constant returns to scale.

8. In the space below, draw the long-run average total cost curve for a firm experiencing decreasing returns to scale. Explain your diagram. Give an example of a type of firm that experiences decreasing returns to scale.

9. In the space below, draw the long-run average total cost curve for a firm experiencing increasing returns to scale. Explain your diagram. Give an example of a type of firm that experiences increasing returns to scale.

### Part C

Indicate whether you think the following statements are true, false or uncertain. Explain why.

10. In the long run, a cost-minimizing firm will overutilize its plant when it produces at an output level greater than the optimal level.
11. The short-run average total cost curve declines and then increases as a factor input increases because of economies and diseconomies of scale.