

CHAPTER 12

Production and Cost Analysis II

Chapter Goals

- Distinguish technical efficiency from economic efficiency.
- Explain how economies and diseconomies of scale influence the shape of long-run cost curves.
- Explain the role of the entrepreneur in translating cost of production to supply.
- Discuss some of the problems of using cost analysis in the real world.

Production Decisions

- Firms have more options in the long run and they can change any input they want.
- Neither plant size nor technology available is given.
- Firms look at costs of various inputs and the technologies available for combining these inputs.
- They choose the combination that offers the lowest cost.

Technical and Economic Efficiency

When choosing among existing technologies in the long run, firms are interested in the lowest cost (economically efficient) methods of production.

Technical efficiency means that a production process uses as few inputs as possible to produce a given level of output.

- With multiple inputs, many production processes can be technically efficient.
- Technical efficiency does not indicate economic efficiency.

Technical and Economic Efficiency

The **economically efficient** method of production is the method that produces a given level of output at the lowest possible cost.

It is the least-cost technically efficient process that has the lowest cost.

The economically efficient production processes is the technically efficient method of production that has the lowest cost.

The Shape of the Long-Run Cost Curve

The law of diminishing marginal productivity applies to the short run but not the long run.

All inputs are variable in the long run.

The most important determinants of economical efficiency in the long run:

- Economies of scale
- Diseconomies of scale

Economies of Scale

Production exhibits **economies of scale** when long-run average total costs decrease as output increases.

- These are shown by the downward-sloping portion of the long-run average total cost curve.

An **indivisible setup cost** is the cost of an indivisible input for which a certain minimum amount of production must be undertaken before the input becomes economically feasible to use.

- The cost of a blast furnace or an oil refinery is an example of an indivisible setup cost.
- Indivisible setup costs create many real-world economies of scale.

Economies of Scale

Because of the importance of economies of scale, business people often talk about the minimum efficient level of production.

The **minimum efficient level of production** is the amount of production that spreads setup costs out sufficiently for firms to undertake production profitably.

The minimum efficient level of production is reached once the size of the market expands to a size large enough for firms to take advantage of all economies of scale.

Diseconomies of Scale

Production exhibits **diseconomies of scale** when long-run average total costs increase as output increases.

- These are shown by the upward sloping portion of the long-run average total cost curve.

Diseconomies of scale usually, but not always, start occurring as firms get large.

Diminishing marginal productivity is not the cause of diseconomies of scale.

Diseconomies of Scale

There are two reasons for diseconomies of scale. As the size of the firm increases, these occur:

1. Increased **monitoring costs** (the costs incurred by the organizer of production in seeing to it that the employees do what they're supposed to do)
2. Loss of **team spirit or morale** (the feelings of friendship and being part of a team that bring out people's best efforts)

Constant Returns to Scale

Firms experience **constant returns to scale** when long-run average total costs do not change as output increases.

Constant returns to scale are shown by the flat portion of the long-run average total cost curve.

Because of the importance of economies of scale, business people often talk about the minimum efficient level of production.

- This occurs before monitoring costs rise and team spirit is lost.

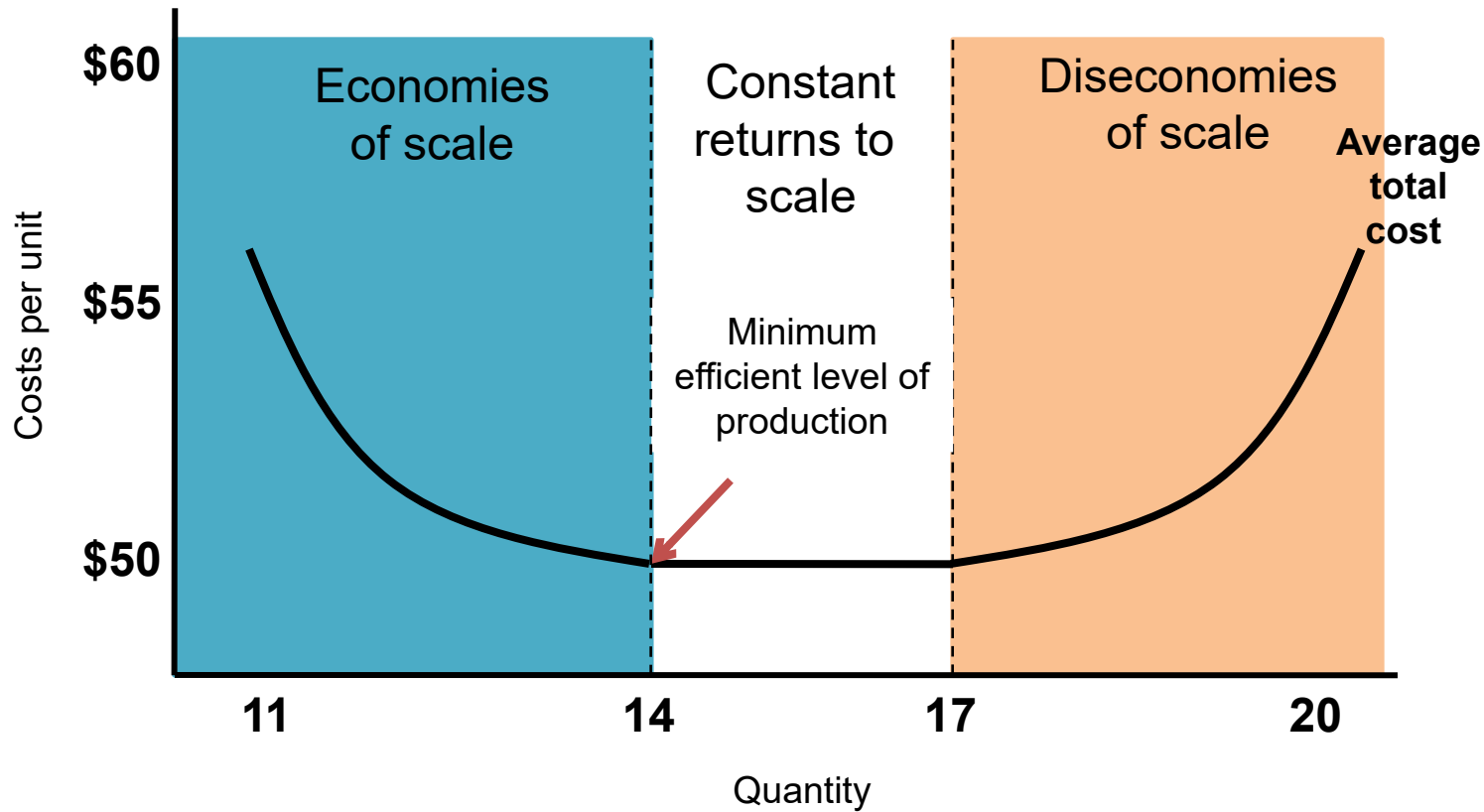
The Importance of Economies and Diseconomies of Scale

- Economies and diseconomies of scale play important roles in real-world production decisions.
- The long-run and short-run average cost curves have the same U-shape, but the underlying causes of this shape differ.
- Economies and diseconomies of scale account for the shape of the long-run average cost curve.
- Initially economies of scale drive average costs down, then diseconomies of scale drive average costs up.

A Typical Long-Run Average Total Cost Table

Q	TC of Labor (\$)	TC of Machines (\$)	TC (\$)	ATC (\$)	
11	381	254	635	58	ATC falls because of economies of scale.
12	390	260	650	54	
13	402	268	670	52	
14	420	280	700	50	ATC is constant because of constant returns to scale.
15	450	300	750	50	
16	480	320	800	50	
17	510	340	850	50	
18	549	366	915	51	ATC rises because of diseconomies of scale.
19	600	400	1,000	53	
20	666	444	1,110	56	

A Typical Long-Run Average Total Cost Curve



The Envelope Relationship

Long-run costs are always less than or equal to short-run costs because:

- In the long run, all inputs are flexible.
- In the short run, some inputs are fixed.

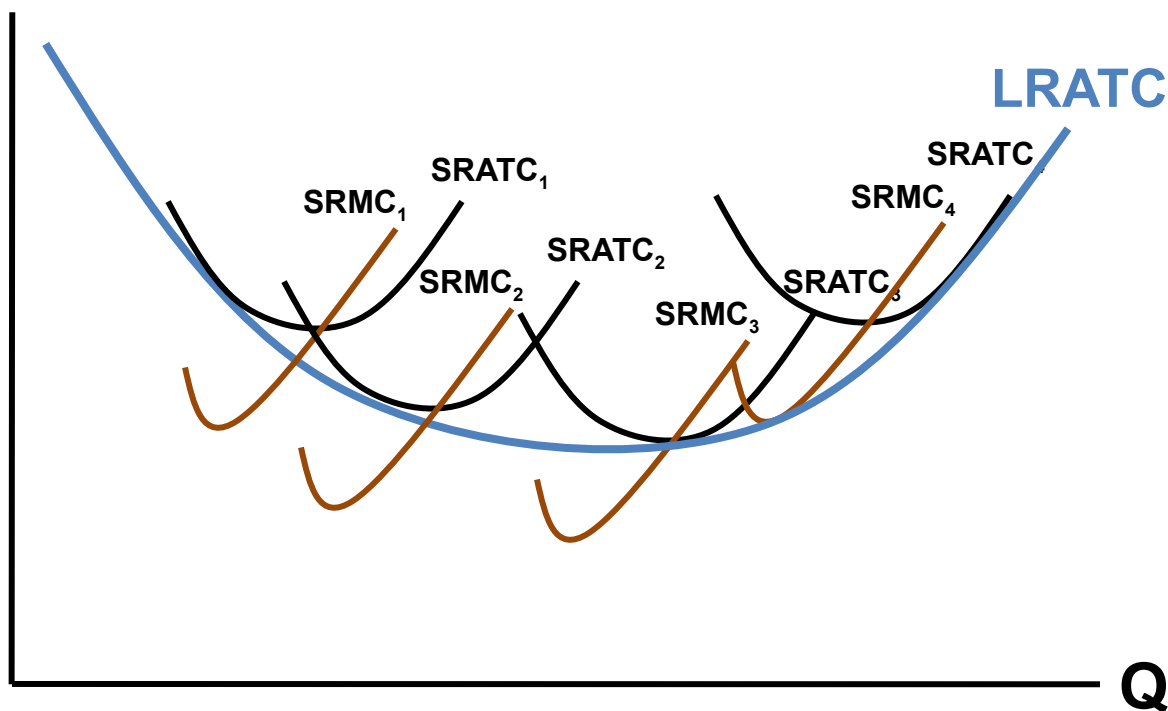
There is an **envelope relationship** between long-run and short-run average total costs. Each short-run cost curve touches the long-run cost curve at only one point.

In the short run all expansion must proceed by increasing only the variable input.

- This constraint increases cost.

The Envelope of Short-Run Average Total Cost Curves

Costs
per unit



The long-run average total cost curve (LRATC) is an envelope of the short-run average total cost curves ($SRATC_{1-4}$).

Entrepreneurial Activity and the Supply Decision

The difference between the expected price of a good and the expected average total cost of producing it is the supplier's expected economic profit per unit.

Profit underlies the dynamics of production in a market economy.

The expected price must *exceed* the opportunity cost of supplying the good for a good to be supplied.

Entrepreneurial Activity and the Supply Decision

An **entrepreneur** is an individual who sees an opportunity to sell an item at a price higher than the average cost of producing it.

Entrepreneur is the:

- Organizer of production
- One who visualizes the demand
- One who convinces the resource owners to produce
- Hidden element of supply that is essential to the continued growth of an economy.

Social entrepreneurship – entrepreneurs focus on achieving social, rather than just economic, ends; they blend profit motives with other motives into the charters of the corporations, making them *for-benefit, not for-profit, corporations*.

Using Cost Analysis in the Real World

Some of the problems of using cost analysis in the real-world include the following:

- Economies of scope
- Learning by doing and technological change
- Many dimensions
- Unmeasured costs
- Joint costs
- Indivisible costs
- Uncertainty
- Asymmetries
- Multiple planning and adjustment periods with many different short runs

Economies of Scope

- The cost of production of one product often depends on what other products a firm is producing.
- There are **economies of scope** when the costs of producing goods are interdependent so that it is less costly for a firm to produce one good when it is already producing another.
- Firms look for both economies of scope and economies of scale.
- Globalization has made economies of scope even more important to firms in their production decisions.

Learning by Doing and Technological Change

Production techniques available to real-world firms are constantly changing.

Learning by doing means that as we do something, we learn what works and what doesn't, and over time we become more proficient at it.

Technological change is an increase in the range of production techniques that leads to more efficient ways of producing goods and the production of new and better goods.

These changes occur over time and cannot be predicted accurately.

Many Dimensions

Most decisions that firms make involve more than one dimension, including:

- Quality
- Packaging
- Shipping

The only dimension of output in the standard model is how much to produce.

Good economic decisions take all relevant margins into account.

Unmeasured Costs

- Economists include opportunity costs while accountants use explicit costs that can be measured.
- Economists include the owner's opportunity cost which is the forgone income that the owner could have earned in another job.
- In measuring the costs of depreciable assets, accountants use historical cost which is what a depreciable item costs in terms of money actually spent for it as the cost basis.

If the depreciable asset increased in value, an economist would count its increased value as revenue.

The Standard Model as a Framework

- The standard model can be expanded to include these real-world complications.
- Despite its limitations, the standard model provides a good framework for cost analysis.
- Introductory cost analysis provides a framework for starting to think about real-world cost measurement.

Chapter Summary

An economically efficient production process must be technically efficient, but a technically efficient process may not be economically efficient

The long-run average total cost curve is U-shaped because economies of scale cause average total cost to decrease; diseconomies of scale eventually cause average total cost to increase

Production is a social, as well as a technical, phenomenon; that's why concepts like team spirit are important—and that's why diseconomies of scale occur.

Chapter Summary

Marginal cost and short-run average cost curves slope upward because of diminishing marginal productivity.

The long-run average cost curve slopes upward because of diseconomies of scale.

There is an envelope relationship between short-run average cost curves and long-run average cost curves. The short-run average cost curves are always above the long-run average cost curve.

Chapter Summary

An entrepreneur is an individual who sees an opportunity to sell an item at a price higher than the average cost of producing it.

Once we start applying cost analysis to the real world, we must include a variety of other dimensions of costs that the traditional model does not cover.

Costs in the real world are affected by economies of scope, learning by doing and technological change, the many dimensions to output, and unmeasured costs such as opportunity costs