Intermediate Microeconomics. Lecture 16

Perfect Competition

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Market Structures

We categorize a market or industry using three primary characteristics:

- **Number of firms**. Generally, the more companies in the market, the more competitive it is
- **Types of Products Sold**. In general, the more indistinguishable or identical the products are, the more competitive the market is
- **Barriers to entry**. If new firms can enter a market easily, the market is more competitive

Market Structures

Table 8.1 Four Basic Market Structures

	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Number of Firms	Many	Many	Few	One
Type of Products Sold	Identical	Differentiated	Identical or differentiated	Unique
Barriers to Entry	None	None	Some	Many

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Perfect Competition

Here's how the three primary market characteristics look in a perfectly competitive market

- **Number of firms**. There needs to be a large number of firms so that no one firm has any impact on the market equilibrium price by itself
- **Types of Products Sold**. All firms produce an identical product
- **Barriers to entry**. There are no barriers to entry

Demand Curve as Seen by a Price Taker

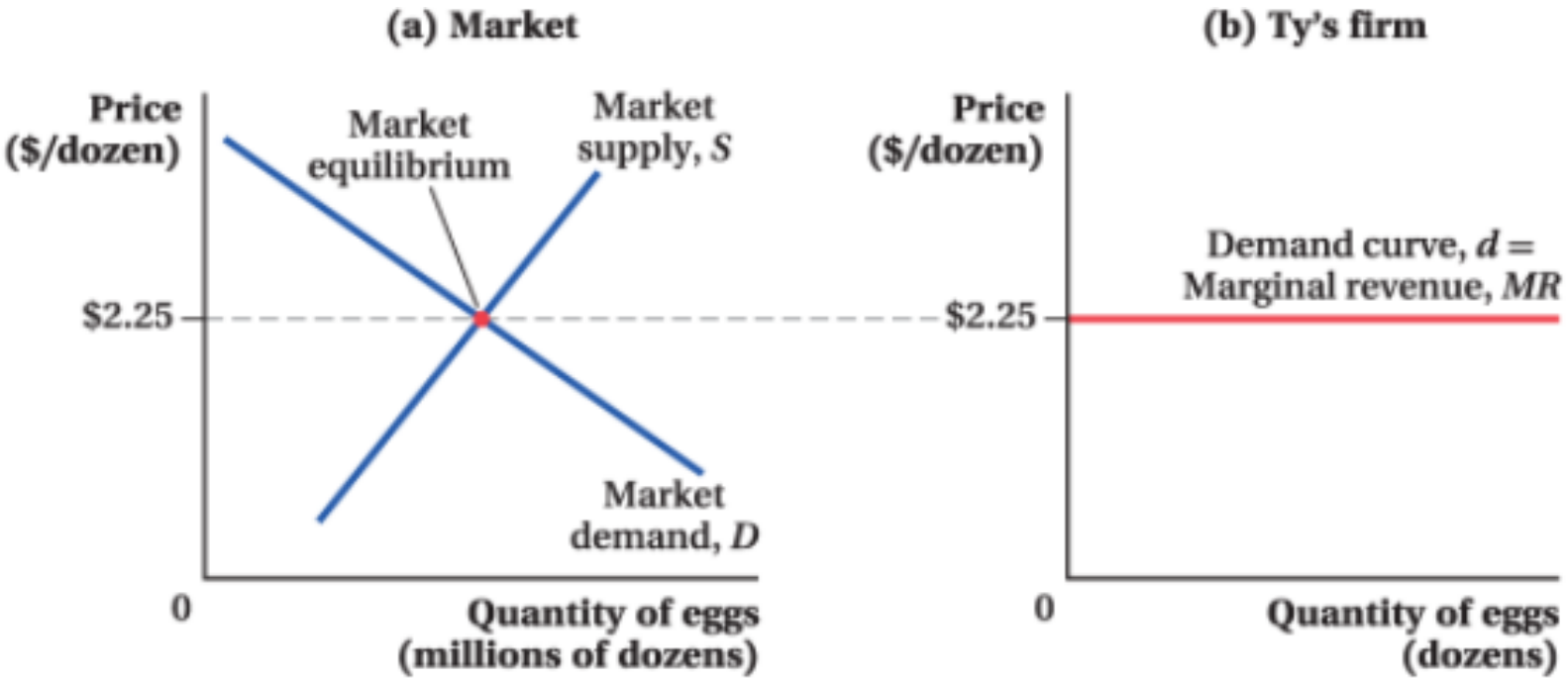

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Figure: Market and Firm Demand in Perfect Competition

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Profit Maximization

Mathematically, let's denote the profit a firm makes as π. The profit function is total revenue TR minus total cost TC

$$\pi = TR - TC$$

- To figure out the level of output that maximizes profit, think about what happens to total cost and total revenue if the firm decides to produce one additional unit of output
- Put differently, determine the firm's marginal cost and marginal revenue

Profit Maximization

Marginal cost is the addition to total cost of producing one more unit of output

$$MC = \frac{\Delta TC}{\Delta Q}$$

$$MC = \frac{\partial TC(Q)}{\partial Q}$$

A firm's marginal revenue is the additional revenue it gets from selling one additional unit of output

$$MR = \frac{\Delta TR}{\Delta Q}$$

$$MR = \frac{\partial TR(Q)}{\partial Q}$$

Profit Maximization

In a perfectly competitive market, marginal revenue equals the market price

$$MR = P$$

- When a firm is a price taker, P does not change no matter what happens to Q
- For a price taker, P is a constant, not a function of Q

$$MR = \frac{\Delta TR}{\Delta Q} = \frac{\Delta P \cdot Q}{\Delta Q} = P\frac{\Delta Q}{\Delta Q} = P$$

Profit Maximization

The optimization problem is the following

$$max \;\; \pi = TR(Q) - TC(Q)$$

FOC

$$\frac{\partial TR(Q)}{\partial Q} - \frac{\partial TC(Q)}{\partial Q} = 0$$

$$\boxed{MR = MC}$$

The profit-maximizing level of output occurs where marginal revenue (here, price) equals marginal cost ($P = MC$)

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Measuring a Firm's Profit

To measure profit π, we subtract total cost TC from total revenue TR

$$\pi = TR - TC$$

$$\pi = (P \cdot Q) - (ATC \cdot Q)$$

$$\pi = (P - ATC)Q$$

Measuring a Firm's Profit

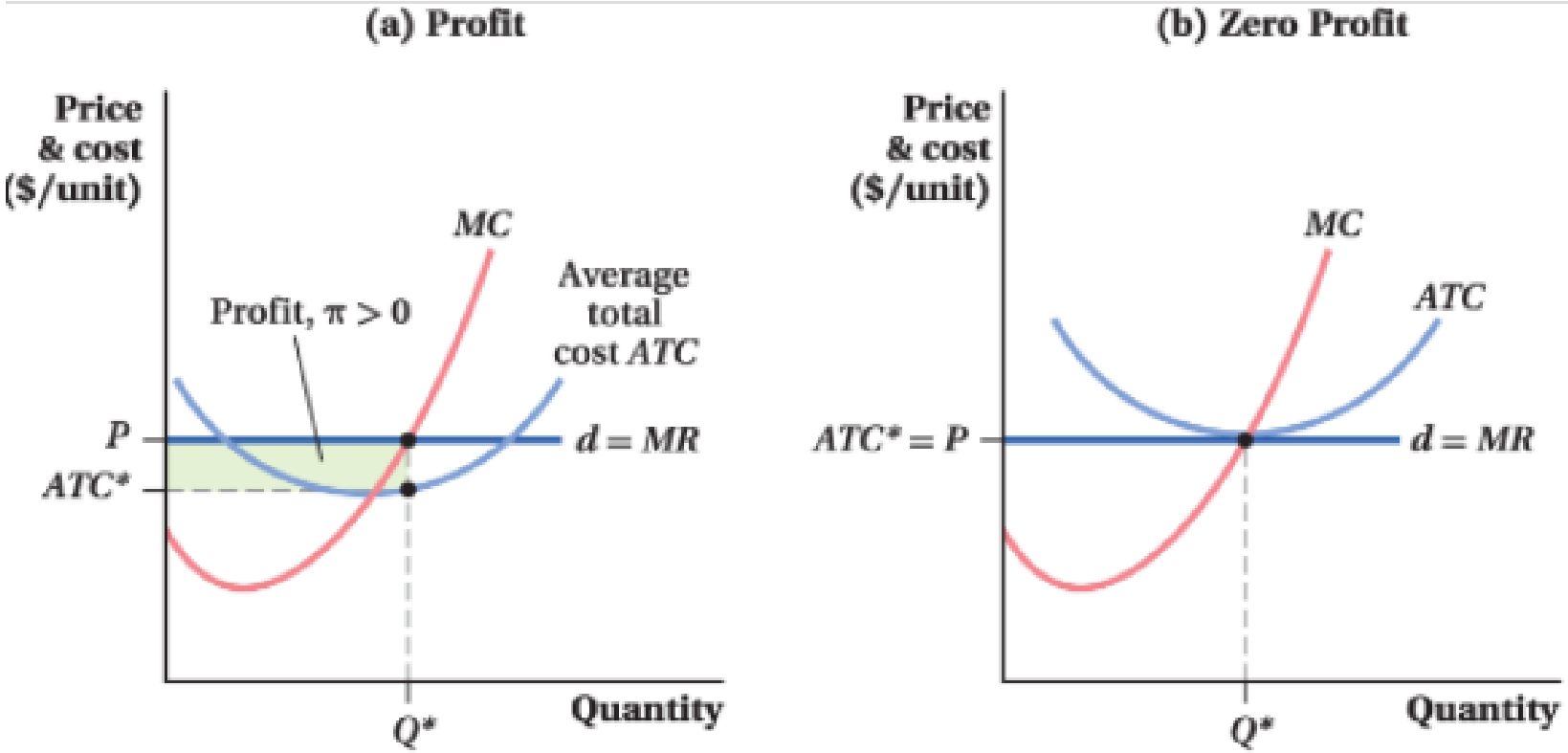

Figure: Measuring Profit

Measuring a Firm's Profit

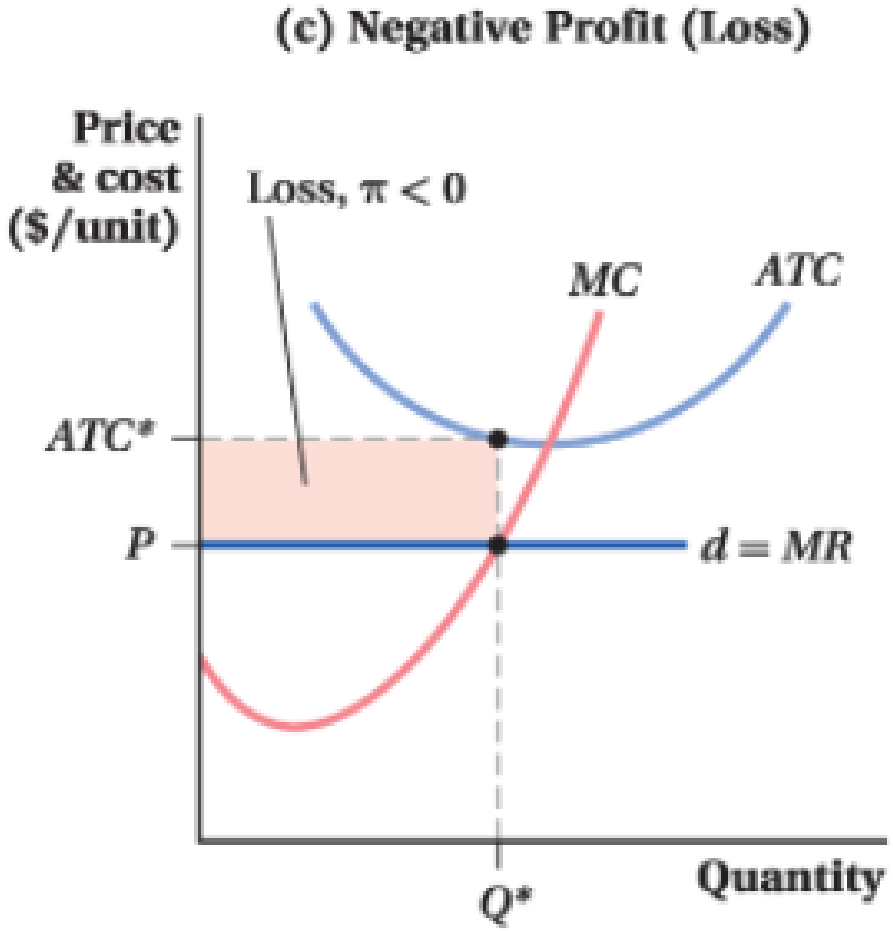

Figure: Measuring Profit

If Profit Is Negative, Should a Firm Shut Down?

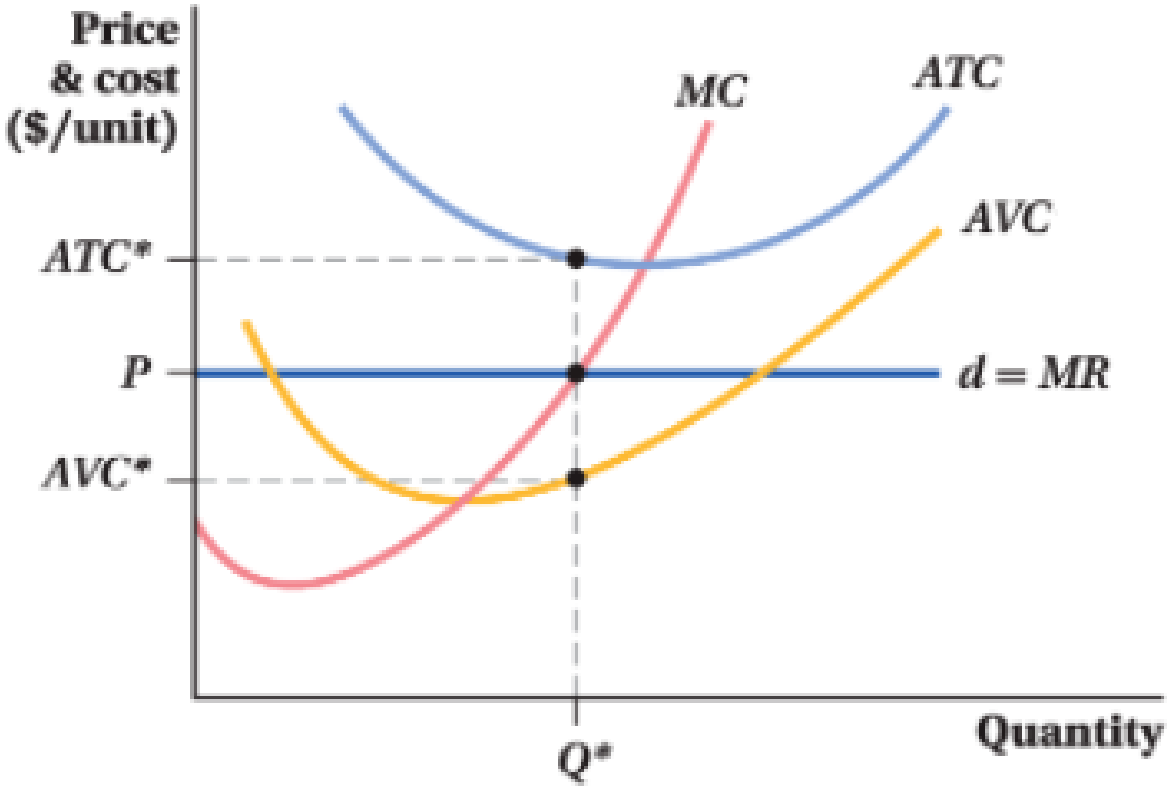

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Figure: Deciding Whether to Operate or Shut Down in the Short Run

Example

Cardboard boxes are produced in a perfectly competitive market. Each identical firm has a short-run total cost curve of

$$TC = 3Q^3 - 18Q^2 + 30Q + 50$$

- Calculate the price below which a firm in the market will not produce any output in the short run (the shut-down price)

A firm will not produce any output in the short run at any price below its minimum AVC, which is found when

$$AVC = MC$$

Example

$$AVC = MC$$

$$3Q^2 - 18Q + 30 = 9Q^2 - 36Q + 30$$

$$Q = 3$$

To find the level of AVC at this output, we plug $Q = 3$ into the formula for AVC

$$AVC = 3(3)^2 - 18(3) + 30 = 3$$

Therefore, the minimum price at which the firm should operate is \$3. If the price falls below \$3, the firm should shut down in the short run and only pay its fixed cost

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Short-Run Supply Curve

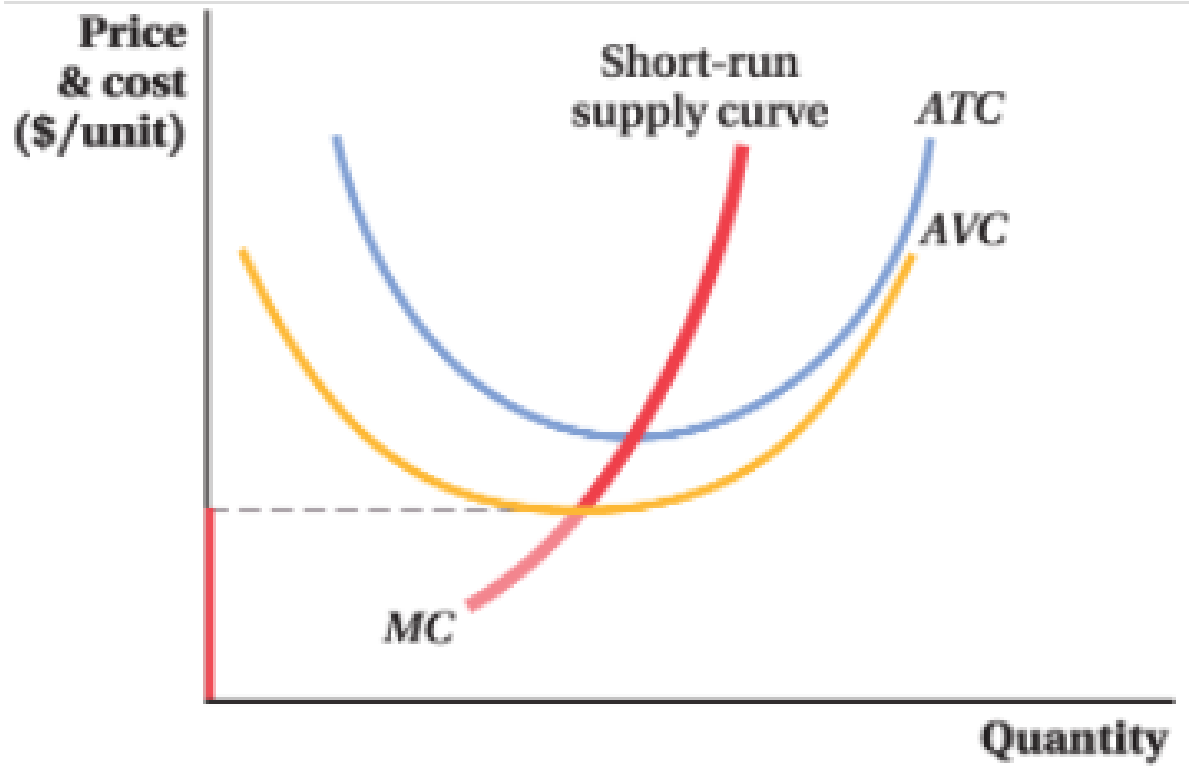

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Figure: Perfectly Competitive Firm's Short-Run Supply Curve

Producer Surplus for a Competitive Firm in the Short Run

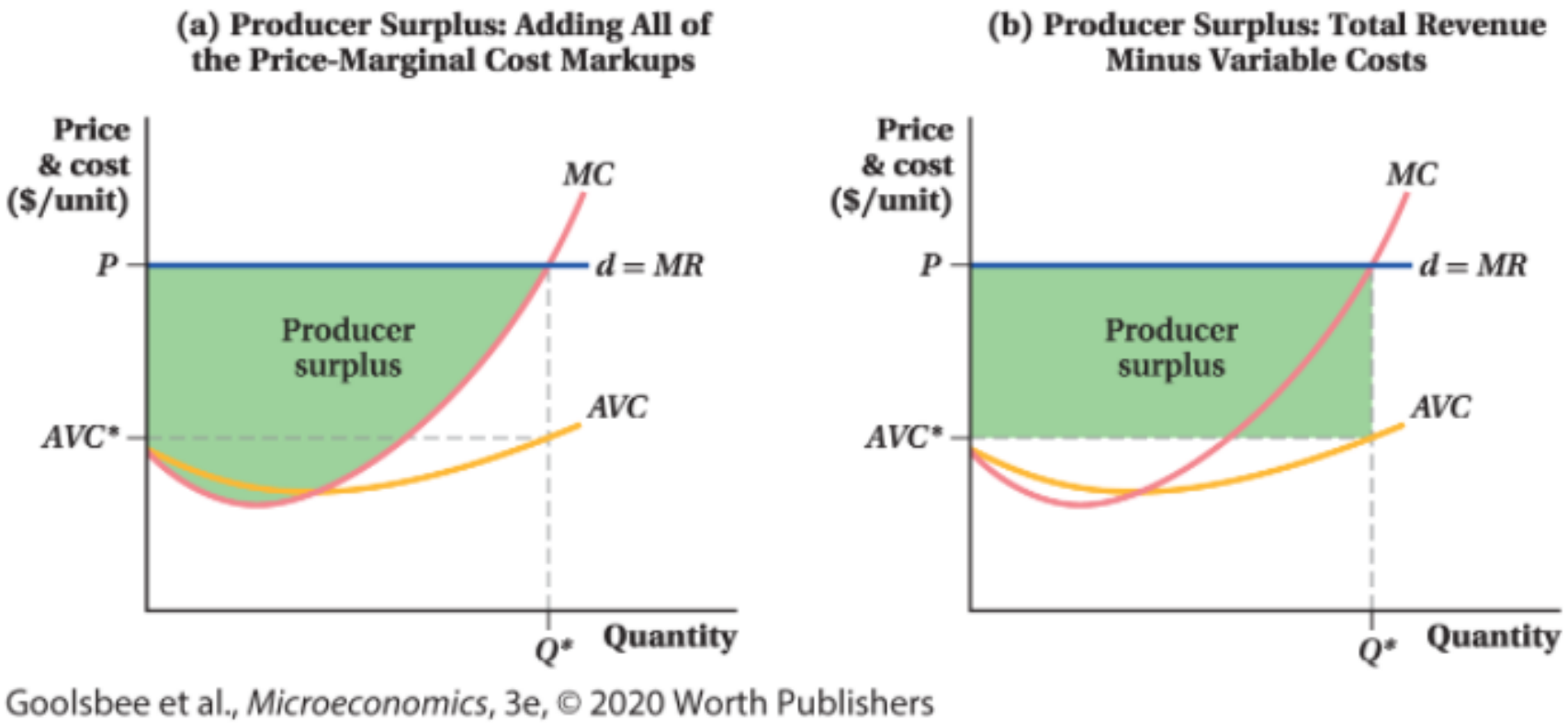

Figure: Producer Surplus for a Firm in Perfect Competition

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Long Run

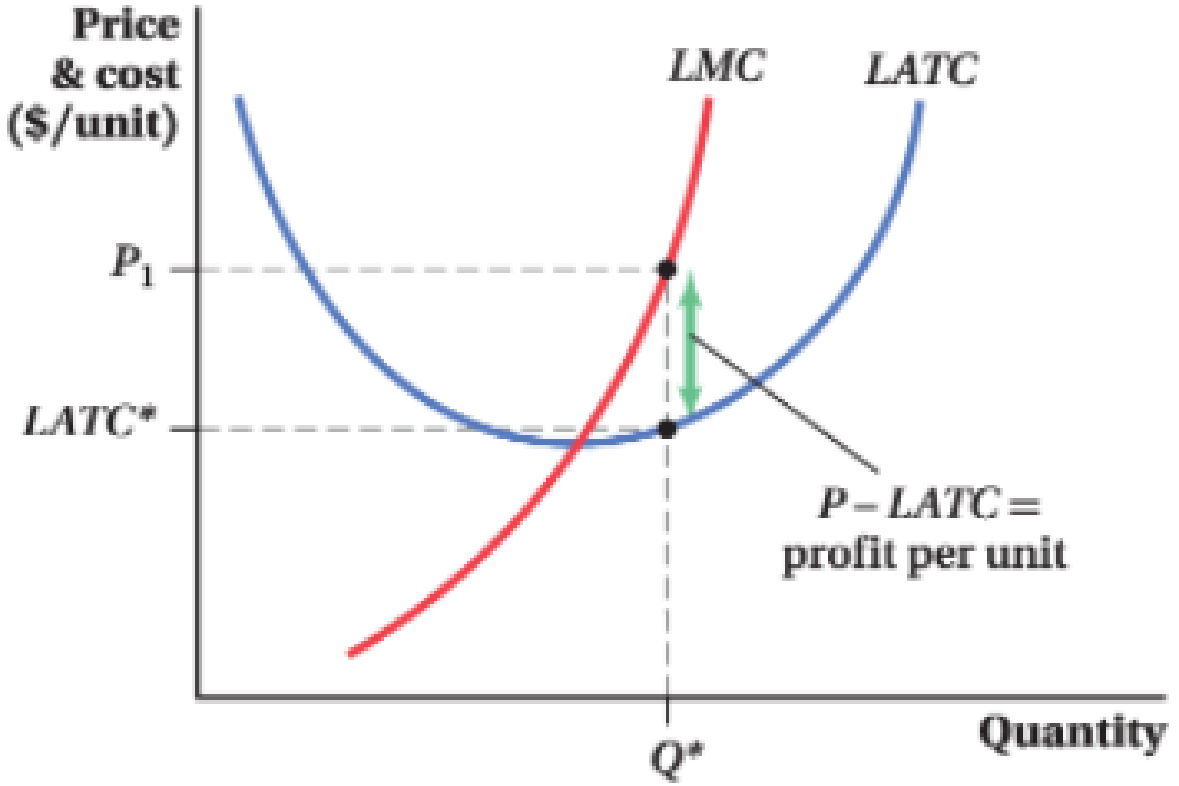

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Figure: Positive Long-Run Profit

Long Run

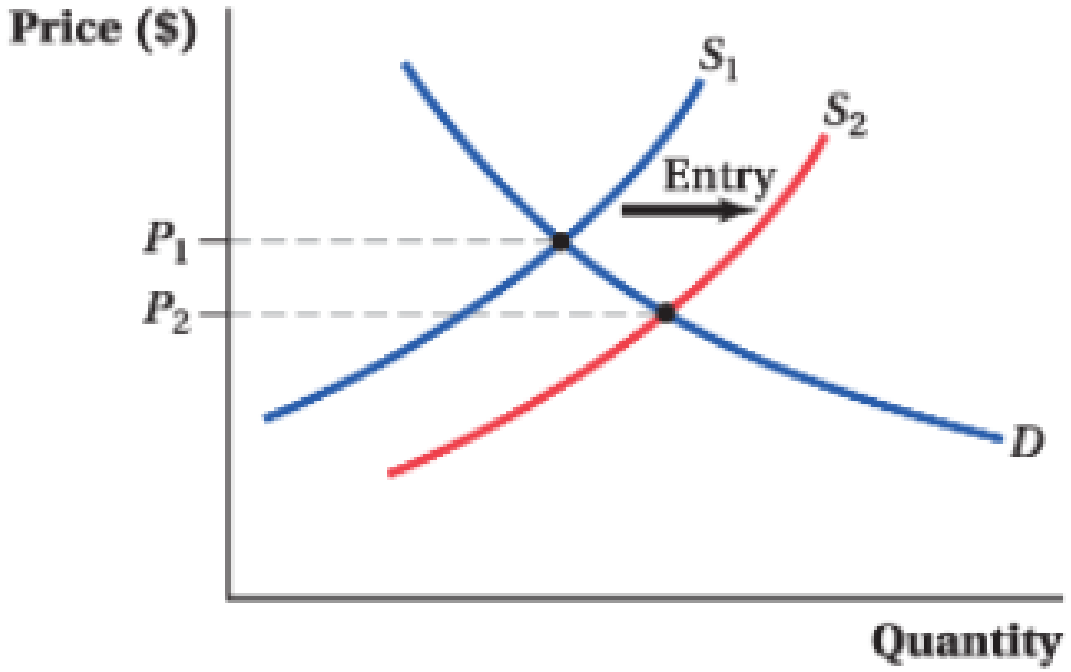

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Figure: Entry of New Firms Increases Supply and Lowers Equilibrium Price

Long Run

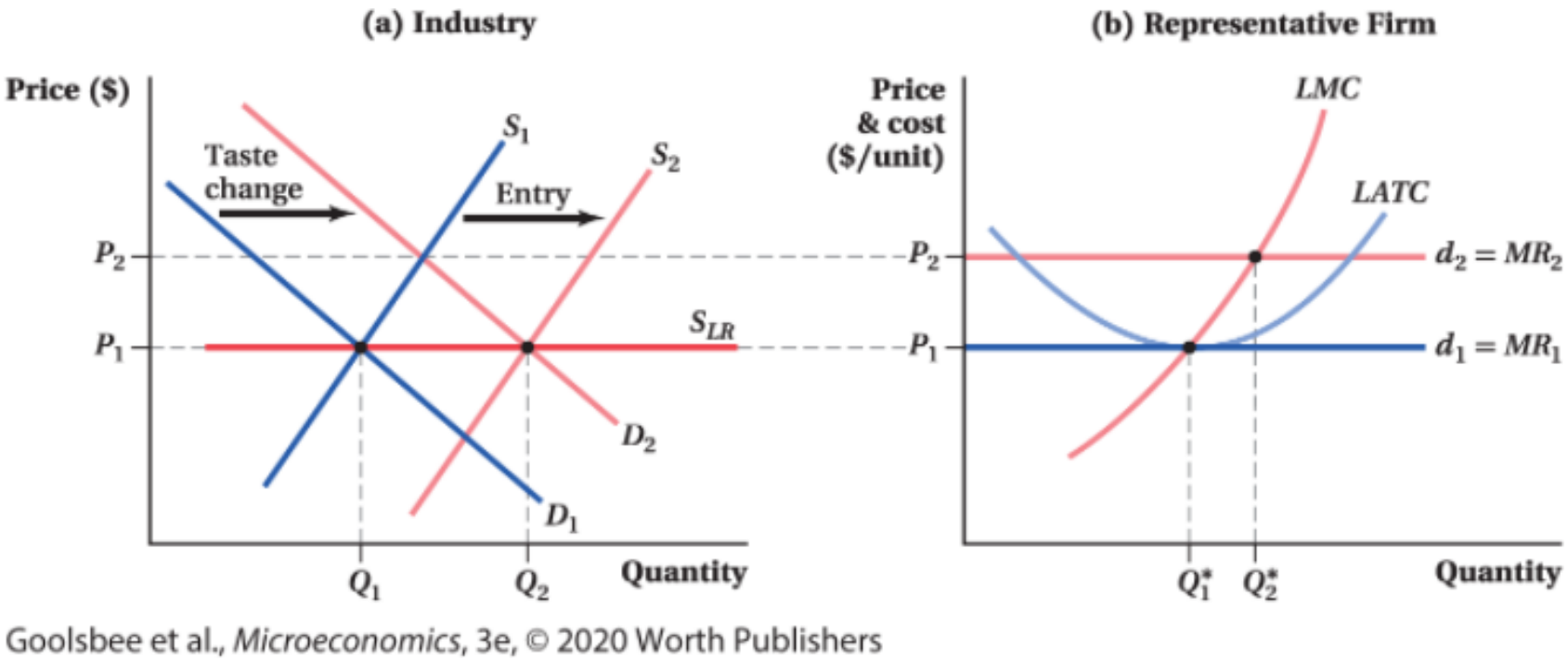

Figure: Deriving the Long-Run Industry Supply Curve