Firms in Competitive Markets

WHAT IS A COMPETITIVE MARKET?
• A perfectly competitive market has the following characteristics:
  • There are many buyers and sellers in the market.
  • The goods offered by the various sellers are largely the same.
  • Firms can freely enter or exit the market.
• As a result of its characteristics, the perfectly competitive market has the following outcomes:
  • The actions of any single buyer or seller in the market have a negligible impact on the market price.
  • Each buyer and seller takes the market price as given.
  • A competitive market has many buyers and sellers trading identical products so that each buyer and seller is a price taker.
  • Buyers and sellers must accept the price determined by the market.

The Revenue of a Competitive Firm
• Total revenue for a firm is the selling price times the quantity sold.
  \[ TR = ( P \times Q) \]
• Total revenue is proportional to the amount of output.
• Average revenue tells us how much revenue a firm receives for the typical unit sold.
• Average revenue is total revenue divided by the quantity sold.
• In perfect competition, average revenue equals the price of the good.

\[
\text{Average Revenue} = \frac{\text{Total revenue}}{\text{Quantity}}
\]

\[
= \frac{\text{Price} \times \text{Quantity}}{\text{Quantity}}
\]

\[
= \text{Price}
\]

• Marginal revenue is the change in total revenue from an additional unit sold.
\[ \text{MR} = \frac{\Delta \text{TR}}{\Delta Q} \]
• For competitive firms, marginal revenue equals the price of the good.
PROFIT MAXIMIZATION AND THE COMPETITIVE FIRM’S SUPPLY CURVE

• The goal of a competitive firm is to maximize profit.
• This means that the firm will want to produce the quantity that maximizes the difference between total revenue and total cost.

### Table 1 Total, Average, and Marginal Revenue for a Competitive Firm

<table>
<thead>
<tr>
<th>Quantity (Q)</th>
<th>Price (P)</th>
<th>Total Revenue (TR = P × Q)</th>
<th>Average Revenue (AR = TR/Q)</th>
<th>Marginal Revenue (MR = ΔTR/ΔQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gallon</td>
<td>$6</td>
<td>$6</td>
<td>$6</td>
<td>$6</td>
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<tr>
<td>2</td>
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<td>8</td>
<td>6</td>
<td>48</td>
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<td>6</td>
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</tbody>
</table>

### Table 2 Profit Maximization: A Numerical Example

<table>
<thead>
<tr>
<th>Quantity (Q)</th>
<th>Total Revenue (TR)</th>
<th>Total Cost (TC)</th>
<th>Profit (TR – TC)</th>
<th>Marginal Revenue (MR = ΔTR/ΔQ)</th>
<th>Marginal Cost (MC = ΔTC/ΔQ)</th>
<th>Change in Profit (MR – MC)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>$0</td>
<td>$3</td>
<td>$3</td>
<td>$6</td>
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<td>$4</td>
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</table>
The firm maximizes profit by producing the quantity at which marginal cost equals marginal revenue.

- Profit maximization occurs at the quantity where marginal revenue equals marginal cost.
  - When $MR > MC$ increase $Q$
  - When $MR < MC$ decrease $Q$
  - When $MR = MC$ Profit is maximized.

This section of the firm's $MC$ curve is also the firm's supply curve.
The Firm’s Short-Run Decision to Shut Down
• A shutdown refers to a short-run decision not to produce anything during a specific period of time because of current market conditions.
• Exit refers to a long-run decision to leave the market.
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• Exit refers to a long-run decision to leave the market.
• The firm considers its sunk costs when deciding to exit, but ignores them when deciding whether to shut down.
• Sunk costs are costs that have already been committed and cannot be recovered.
• The firm shuts down if the revenue it gets from producing is less than the variable cost of production.
  • Shut down if $TR < VC$
  • Shut down if $TR/Q < VC/Q$
  • Shut down if $P < AVC$

![Diagram showing the firm's short-run supply curve.]

The portion of the marginal-cost curve that lies above average variable cost is the competitive firm’s short-run supply curve.

The Firm’s Long-Run Decision to Exit or Enter a Market
• In the long run, the firm exits if the revenue it would get from producing is less than its total cost.
  • Exit if $TR < TC$
  • Exit if $TR/Q < TC/Q$
  • Exit if $P < ATC$
• A firm will enter the industry if such an action would be profitable.
• Enter if $TR > TC$
• Enter if $TR/Q > TC/Q$
• Enter if $P > ATC$

**THE SUPPLY CURVE IN A COMPETITIVE MARKET**

• The competitive firm’s long-run supply curve is the portion of its marginal-cost curve that lies above average total cost.

• Short-Run Supply Curve • The portion of its marginal cost curve that lies above average variable cost.
- Long-Run Supply Curve: The marginal cost curve above the minimum point of its average total cost curve.

(a) A Firm with Profits

(b) A Firm with Losses
Market supply equals the sum of the quantities supplied by the individual firms in the market.

The Short Run: Market Supply with a Fixed Number of Firms
- For any given price, each firm supplies a quantity of output so that its marginal cost equals price.
- The market supply curve reflects the individual firms’ marginal cost curves.

The Long Run: Market Supply with Entry and Exit
- Firms will enter or exit the market until profit is driven to zero.
- In the long run, price equals the minimum of average total cost.
- The long-run market supply curve is horizontal at this price.

At the end of the process of entry and exit, firms that remain must be making zero economic profit.
• The process of entry and exit ends only when price and average total cost are driven to equality.
• Long-run equilibrium must have firms operating at their efficient scale.

**Why Do Competitive Firms Stay in Business If They Make Zero Profit?**
• Profit equals total revenue minus total cost.
• Total cost includes all the opportunity costs of the firm.
• In the zero-profit equilibrium, the firm’s revenue compensates the owners for the time and money they expend to keep the business going.

**Summary**
• Because a competitive firm is a price taker, its revenue is proportional to the amount of output it produces.
• The price of the good equals both the firm’s average revenue and its marginal revenue.
• To maximize profit, a firm chooses the quantity of output such that marginal revenue equals marginal cost.
• This is also the quantity at which price equals marginal cost.
• Therefore, the firm’s marginal cost curve is its supply curve.
• In the short run, when a firm cannot recover its fixed costs, the firm will choose to shut down temporarily if the price of the good is less than average variable cost.
• In the long run, when the firm can recover both fixed and variable costs, it will choose to exit if the price is less than average total cost.
• In a market with free entry and exit, profits are driven to zero in the long run and all firms produce at the efficient scale.
• Changes in demand have different effects over different time horizons.
• In the long run, the number of firms adjusts to drive the market back to the zero-profit equilibrium.

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