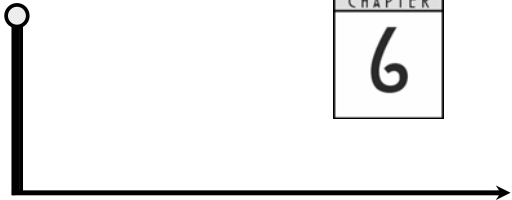

 CHAPTER
6



Thinking About Supply: The Importance of Opportunity Cost

- How much time should Harry spend recycling soft drink containers?
- Harry is choosing between washing dishes for \$6/hour and collecting containers at 2 cents each.
- Opportunity cost of collecting cans is \$6/hour.

Chapter 6: Perfectly Competitive Supply Slide 2

Recycling

Search time (hours/day)	Total number of containers found	Additional number of containers found
0	0	600
1	600	400
2	1,000	300
3	1,300	200
4	1,500	100
5	1,600	

Chapter 6: Perfectly Competitive Supply Slide 3

Thinking About Supply: The Importance of Opportunity Cost

- Costs and Benefits
 - 1 hour collecting cans = $(600)(.02) = \$12$
 - Benefit (\$12) > Opportunity Cost (\$6)
 - 2nd hour benefit (\$8) > Opportunity Cost (\$6)
 - 3rd hour benefit (\$6) = Opportunity Cost (\$6)

Chapter 6: Perfectly Competitive Supply Slide 4

Thinking About Supply: The Importance of Opportunity Cost

- What is the lowest redemption price that would induce Harry to recycle 1 hour/day?
 - 600 containers x 1 cent = \$6 = opportunity cost of washing dishes.

Chapter 6: Perfectly Competitive Supply Slide 5

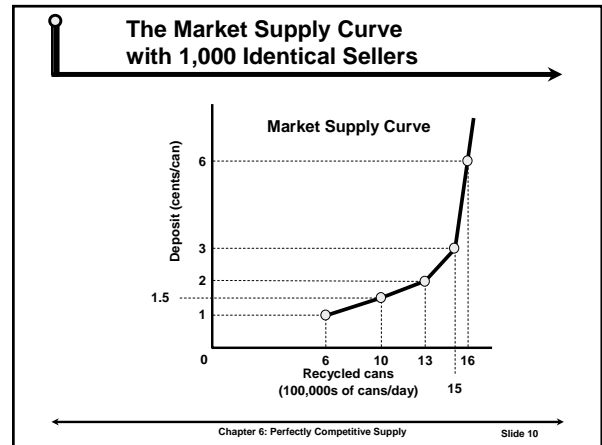
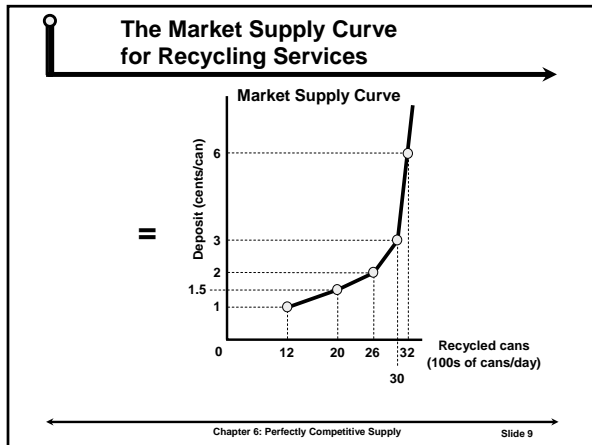
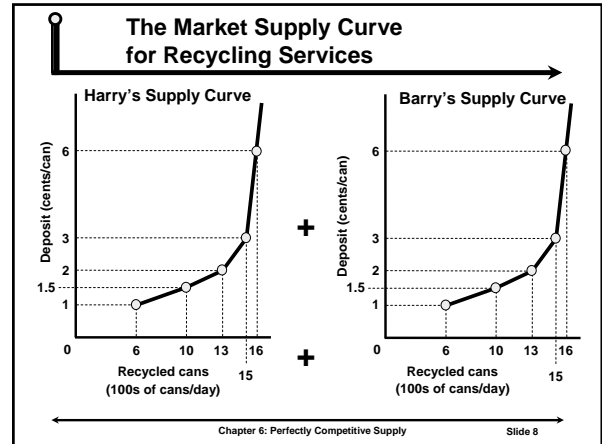
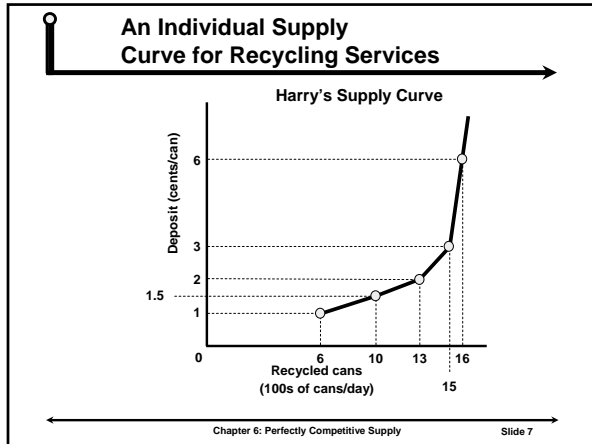
Thinking About Supply: The Importance of Opportunity Cost

- Reservation Price

$p(\Delta Q) = \$6$

 - 1 hour recycling = $p(600) = \$6 = 1 \text{ cent}$
 - 2 hours recycling = $p(400) = \$6 = 1.5 \text{ cents}$
 - 3 hours recycling = $p(300) = \$6 = 2 \text{ cents}$
 - 4 hours recycling = $p(200) = \$6 = 3 \text{ cents}$
 - 5 hours recycling = $p(100) = \$6 = 6 \text{ cents}$

Chapter 6: Perfectly Competitive Supply Slide 6



Thinking About Supply: The Importance of Opportunity Cost

- Why is the supply curve upward sloping?

Chapter 6: Perfectly Competitive Supply Slide 11

Profit-Maximizing Firms in Perfectly Competitive Markets

- Profit
 - Total Revenue - All Costs (explicit & implicit)
- Profit-Maximizing Firms
 - Goal of the firm is to maximize the difference between total revenues and total costs.

Chapter 6: Perfectly Competitive Supply Slide 12

Profit-Maximizing Firms in Perfectly Competitive Markets

- The Perfectly Competitive Market
 - A market in which no individual supplier has significant influence on the market price of the product.
- A Price Taker
 - A firm that has no influence over the price at which it sells its product.

Chapter 6: Perfectly Competitive Supply Slide 13

Profit-Maximizing Firms in Perfectly Competitive Markets

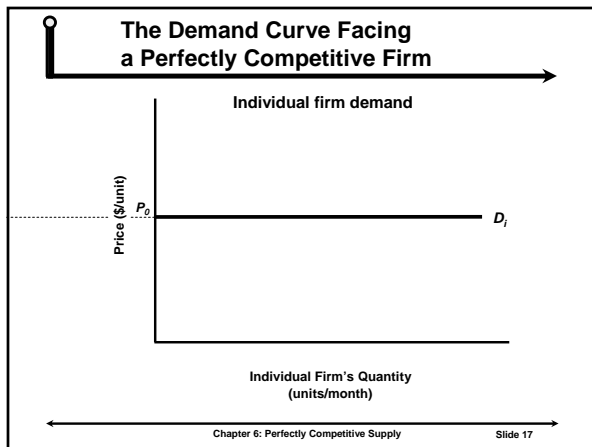
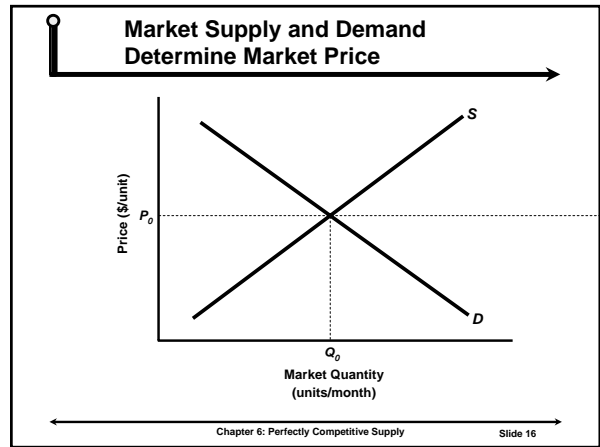
- The Characteristics of Perfect Competition
 1. All firms sell the same standardized product.
 2. The market has many buyers and sellers, each of which buys or sells only a small fraction of the total quantity exchanged.

Chapter 6: Perfectly Competitive Supply Slide 14

Profit-Maximizing Firms in Perfectly Competitive Markets

- The Characteristics of Perfect Competition
 3. Productive resources are mobile
 4. Buyers and sellers are well informed.

Chapter 6: Perfectly Competitive Supply Slide 15



Profit-Maximizing Firms in Perfectly Competitive Markets

- Concepts of production
 - Factor of production
 - ◆ An input used in the production of a good or service.
 - Short run
 - ◆ A period of time sufficiently short that at least some of the firm's factors of production are fixed.

Chapter 6: Perfectly Competitive Supply Slide 18

Profit-Maximizing Firms in Perfectly Competitive Markets

- Concepts of production
 - Fixed factor of production
 - ◆ An input whose quantity cannot be altered in the short run.
 - Variable factor of production
 - ◆ An input whose quantity can be altered in the short run.

Chapter 6: Perfectly Competitive Supply Slide 19

Profit-Maximizing Firms in Perfectly Competitive Markets

- Consider a company that makes glass bottles
 - Two factors of production
 - ◆ Labor (variable)
 - ◆ Capital (fixed)
 - A bottle-making machine

Chapter 6: Perfectly Competitive Supply Slide 20

Employment and Output for a Glass Bottle Maker

Total number of employees per day	Total number of bottles per day
0	0
1	80
2	200
3	260
4	300
5	330
6	350
7	362

Chapter 6: Perfectly Competitive Supply Slide 21

Employment and Output for a Glass Bottle Maker

Total number of employees per day	Additional bottles per day
0	
1	80
2	120
3	60
4	40
5	30
6	20
7	12

Chapter 6: Perfectly Competitive Supply Slide 22

Profit-Maximizing Firms in Perfectly Competitive Markets

- Law of Diminishing Returns
 - When some factors of production are fixed,
 - ◆ increased production of the good eventually requires ever-larger increases in the variable factor, or (equivalently)
 - ◆ increasing the variable factor eventually leads to ever smaller increases in production of the good.

Chapter 6: Perfectly Competitive Supply Slide 23

Profit-Maximizing Firms in Perfectly Competitive Markets

- Some Important Cost Concepts
 - Assume that the cost of the bottle making machine is \$40/day and it is a **fixed cost**.
 - Fixed cost
 - ◆ The sum of all payments made to a firm's fixed factors of production

Chapter 6: Perfectly Competitive Supply Slide 24

Profit-Maximizing Firms in Perfectly Competitive Markets

- Some Important Cost Concepts
 - Assume that the cost of labor is \$12/worker and is a variable cost.
 - Variable cost
 - The sum of all payments made to the firms variable factors of production

Chapter 6: Perfectly Competitive Supply Slide 25

Fixed, Variable, and Total Costs of Bottle Production

Employees per day	Bottles per day	Fixed cost (\$/day)	Variable cost (\$/day)	Total cost (\$/day)	Marginal cost (\$/bottle)
0	0	40	0	40	
1	80	40	12	52	0.15
2	200	40	24	64	0.10
3	260	40	36	76	0.20
4	300	40	48	88	0.33
5	330	40	60	100	0.40
6	350	40	72	112	0.60
7	362	40	84	124	1.00

Chapter 6: Perfectly Competitive Supply Slide 26

Profit-Maximizing Firms in Perfectly Competitive Markets

- Some Important Cost Concepts
 - Total Cost
 - Fixed cost + variable cost
 - Marginal Cost
 - Measures how total cost changes with a change in output

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

Chapter 6: Perfectly Competitive Supply Slide 27

Output, Revenue, Costs, and Profit

Employees per day	Output (bottles/day)	Total revenue (\$/day)	Total cost (\$/day)	Profit (\$/day)
0	0	0	40	-40
1	80	28	52	-24
2	200	70	64	6
3	260	91	76	15
4	300	105	88	17
5	330	115.50	100	15.50
6	350	122.50	112	10.50
7	362	126.70	124	2.70

What will happen to the profit maximizing output if:
 (a) employees receive a wage of \$6/day; (b) fixed costs are \$45?

Chapter 6: Perfectly Competitive Supply Slide 28

Profit-Maximizing Firms in Perfectly Competitive Markets

- A Note on the Firm's Shutdown Condition
 - When producing at a loss, a firm must cover its variable cost to minimize losses.
 - Short-run shutdown condition

$$PxQ < VC \text{ for all levels of } Q$$

Chapter 6: Perfectly Competitive Supply Slide 29

Profit-Maximizing Firms in Perfectly Competitive Markets

- Average Variable Cost and Average Total Cost
 - Average Variable Cost
 - Variable cost divided by total output

$$\frac{VC}{Q}$$

Chapter 6: Perfectly Competitive Supply Slide 30

Profit-Maximizing Firms in Perfectly Competitive Markets

- Average Variable Cost and Average Total Cost
 - Short-run shutdown condition

$$P < \text{minimum value of } AVC$$

Chapter 6: Perfectly Competitive Supply Slide 31

Profit-Maximizing Firms in Perfectly Competitive Markets

- Average Variable Cost and Average Total Cost
 - Average Total Cost
 - ◆ Total cost divided by total output

$$\frac{TC}{Q}$$

Chapter 6: Perfectly Competitive Supply Slide 32

Profit-Maximizing Firms in Perfectly Competitive Markets

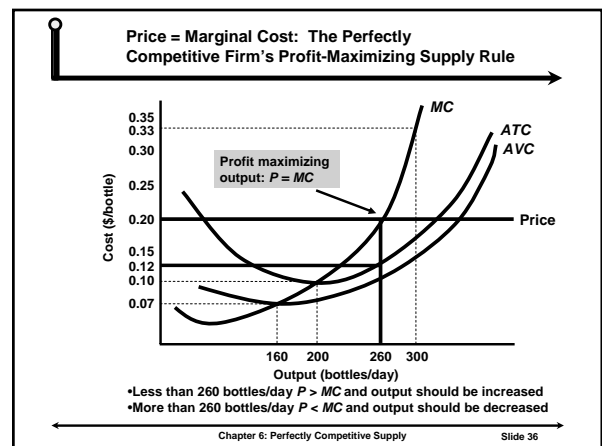
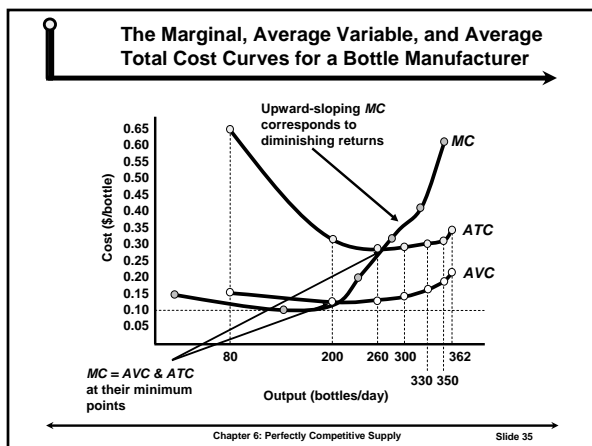
- Average Variable Cost and Average Total Cost
 - Profits = $TR - TC$ or $(P \times Q) - (ATC \times Q)$
 - To be profitable: $P > ATC$

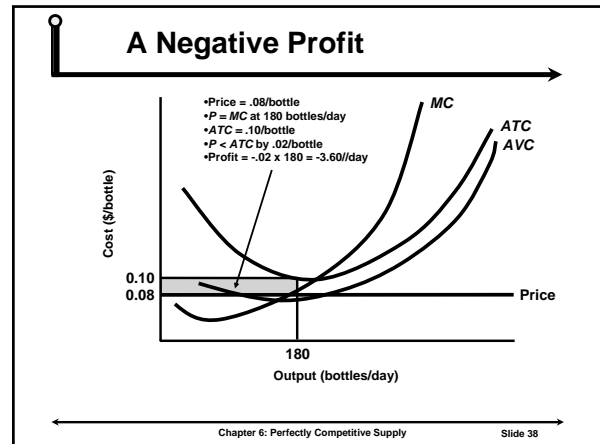
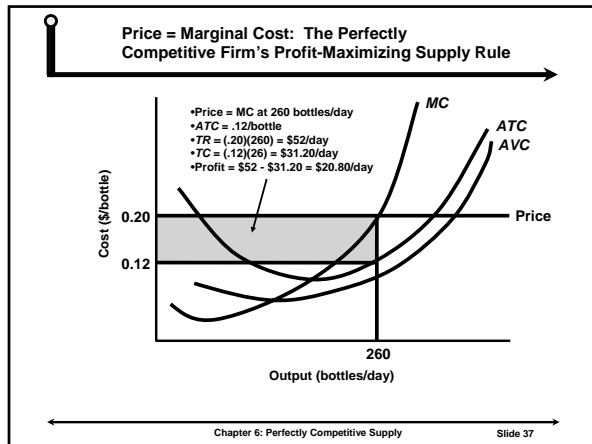
Chapter 6: Perfectly Competitive Supply Slide 33

Average Variable Cost and Average Total Cost of Bottle Production

Employees per day	Bottles per day	Variable cost (\$/day)	Average variable cost (\$/unit of output)	Total cost (\$/day)	Average total cost (\$/unit of output)	Marginal cost (\$/bottle)
0	0	0		40		
1	80	12	0.150	52	0.650	0.15
2	200	24	0.120	64	0.320	0.10
3	260	36	0.138	76	0.292	0.20
4	300	48	0.160	88	0.293	0.30
5	330	60	0.182	100	0.303	0.40
6	350	72	0.206	112	0.320	0.60
7	362	84	0.232	124	0.343	1.00

Chapter 6: Perfectly Competitive Supply Slide 34





- ### Profit-Maximizing Firms in Perfectly Competitive Markets
- The Law of Supply
 - The perfectly competitive firm's supply curve is its marginal cost curve
 - Every quantity of output along the market supply represents the summation of all the quantities individual sellers offer at the corresponding price.
- Chapter 6: Perfectly Competitive Supply Slide 39

- ### Profit-Maximizing Firms in Perfectly Competitive Markets
- The Law of Supply
 - At every point along the market supply curve, price measures what it would cost producers to expand production by one unit.
 - Recall
 - ◆ Demand measures the benefit side of the market.
 - ◆ Supply measures the cost side of the market.
- Chapter 6: Perfectly Competitive Supply Slide 40

- ### Determinants of Supply Revisited
- Determinants of Supply
 - Technology
 - Input prices
 - Number of suppliers
 - Expectations
 - Changes in prices of other products
- Chapter 6: Perfectly Competitive Supply Slide 41

- ### Applying the Theory of Supply
- Economic Naturalist
 - When recycling is left to private market forces, why are many more aluminum beverage containers recycled than glass ones?
- Chapter 6: Perfectly Competitive Supply Slide 42

Applying the Theory of Supply

- What is the socially optimal amount of recycling of glass containers?
 - 60,000 citizens would pay 6 cents for each container which equals marginal benefit
 - The local government pays 6 cents/ container.
 - The optimal quantity occurs where marginal costs = marginal benefit = .06.

Chapter 6: Perfectly Competitive Supply Slide 43

The Supply Curve of Container Recycling Services for Burlington, Vermont

Market supply curve of glass container recycling services

*The optimal quantity of containers is 16,000/day.

Chapter 6: Perfectly Competitive Supply Slide 44

Applying the Theory of Supply

- Will all containers be removed from the environment at \$0.06/container?

Chapter 6: Perfectly Competitive Supply Slide 45

Supply and Producer Surplus

- Producer Surplus
 - The amount by which price exceeds the seller's reservation price.

Chapter 6: Perfectly Competitive Supply Slide 46

The Supply and Demand in the Market for Milk

*Equilibrium $P = \$2$ & $Q = 4,000$

*Producer surplus is the difference between \$2 and the reservation price at each quantity

*Producer surplus = $(1/2)(4,000 \text{ gallons/day})(\$2/\text{gallon}) = \$4,000/\text{day}$

Chapter 6: Perfectly Competitive Supply Slide 47

Producer Surplus in the Market for Milk

Producer surplus = \$4,000/day

Chapter 6: Perfectly Competitive Supply Slide 48