# Intermediate Microeconomics. Lecture 19

## Winners and Losers from Market Power

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# Consumer and Producer Surplus under Market Power

Let's return to the original Apple iPad example. Apple had a marginal cost of \$200 and an inverse demand curve of

$$P = 1,000 - 5Q$$

This demand curve implied a marginal revenue curve

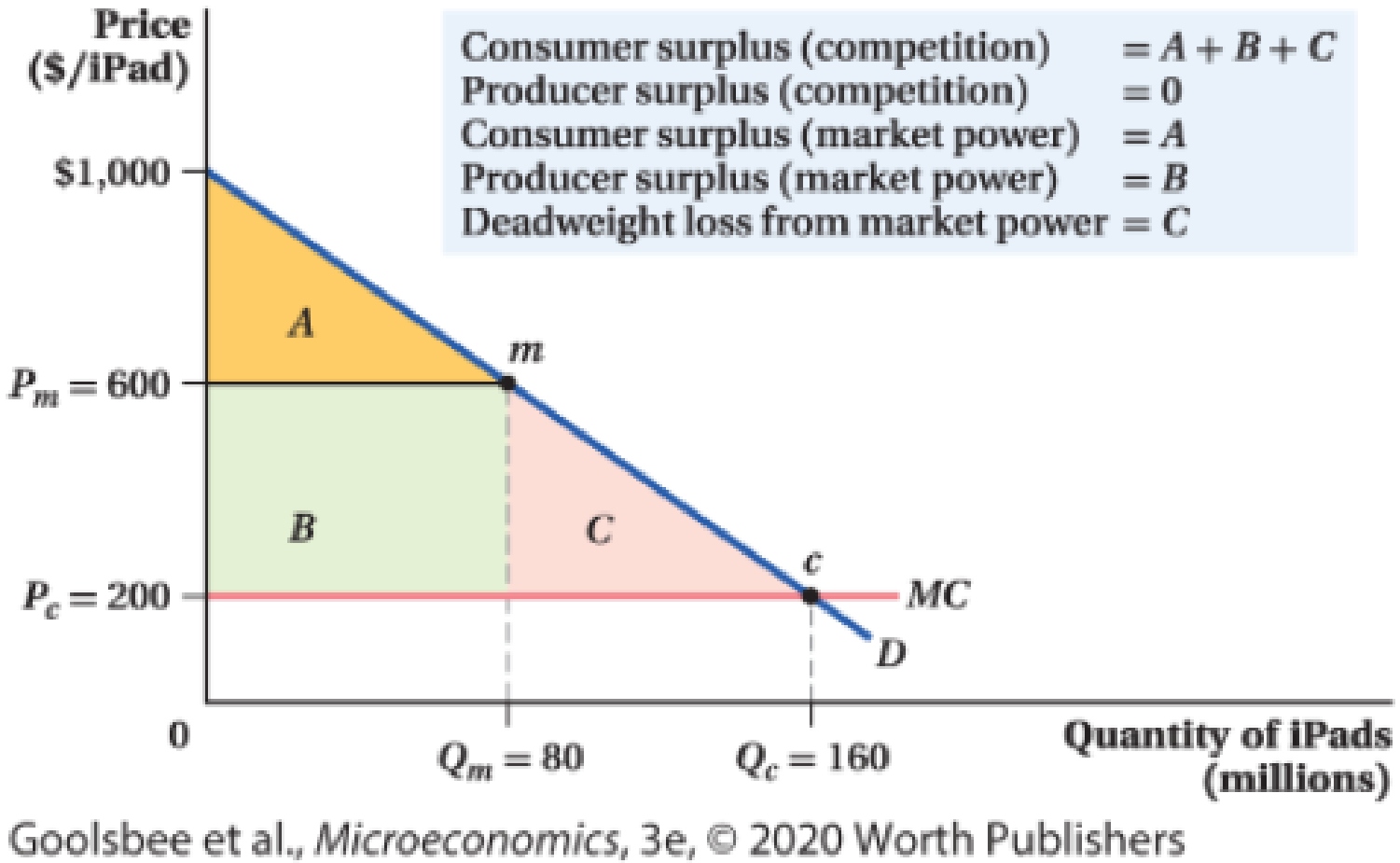
$$MR = \frac{dTR(Q)}{dQ} = 100 - 10Q$$

Using the optimal condition $MR = MC$ we find that

$$\boxed{Q^* = 80}$$

$$\boxed{P^* = 600}$$

# Consumer and Producer Surplus under Market Power




Goolsbee et al., *Microeconomics*, 3e, © 2020 Worth Publishers

**Figure:** Surplus from the Apple iPad

# Consumer and Producer Surplus under Market Power

$$CS = (\frac{1}{2}) * (80) * (400) = 16,000$$

$$PS = (80) * (400) = 32,000$$

$$DWL = (\frac{1}{2}) * (80) * (400) = 16,000$$

# Consumer and Producer Surplus: Perfect Competition

- Now think about how the market would look if Apple behaved like a competitive firm and priced at marginal cost
- The price would be \$200 because marginal cost is constant at \$200
- Plugging \$200 into the demand curve equation yields a quantity of 160 million

$$CS = (\frac{1}{2}) * (160) * (800) = 64,000$$

# Example 1

In a small college town, the demand for delivery pizza is given by

$$Q^D = 800 - 32P$$

- Use the given demand function to derive the associated marginal revenue function

First, obtain the inverse demand equation

$$P = \frac{5}{2} - \frac{1}{32}Q$$

# Example 1

Then, use the definition of total revenue, $TR$, and then derive with respect to $Q$

$$TR = P(Q) \cdot Q = (25 - \frac{1}{32}Q) * Q = 25Q - \frac{1}{32}Q^2$$

$$MR = \frac{dTR(Q)}{dQ} = \frac{d(25Q - \frac{1}{32}Q^2)}{dQ} = 25 - \frac{1}{16}Q$$

$$\boxed{MR = 25 - \frac{1}{16}Q}$$

# Example 2

Consider the following graph, which illustrates the demand for Fluff. Fluff can be produced at a constant marginal and average total cost of \$4 per case

- Apply the $MR = MC$ rule to determine the profit-maximizing output for the monopolist

First find the $MR$ deriving $TR$ with respect to $Q$

$$TR = P(Q) \cdot Q = (20 - \frac{1}{5}Q) * Q = 20Q - \frac{1}{5}Q^2$$

$$MR = \frac{dTR(Q)}{dQ} = \frac{d(20Q - \frac{1}{5}Q^2)}{dQ} = 20 - \frac{2}{5}Q$$

# Example 2

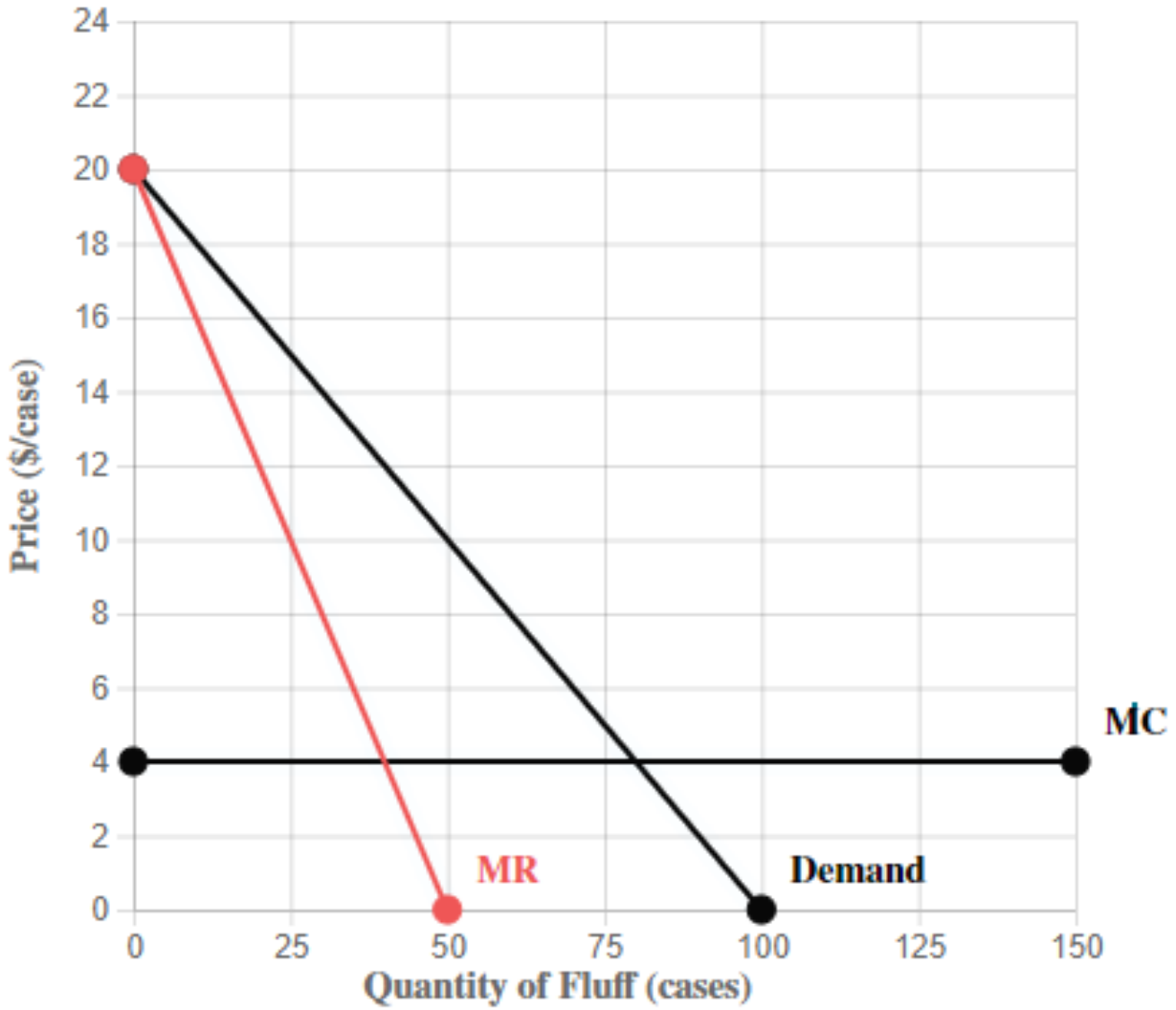



**Figure:** Monopolist demand, example 2

# Example 2

Then use the optimal condition $MR = MC$

$$20 - \frac{2}{5}Q = 4 \;\Rightarrow\; \frac{2}{5}Q = 16 \;\Rightarrow\; \boxed{Q = 40}$$

- Calculate the profit earned by the monopolist

First find the monopoly price substituting the optimal quantity in the demand equation

$$P = 20 - \frac{1}{5}(40) \;\Rightarrow\; P = 12$$

Then compute profits

$$\pi = TR - TC = P \cdot Q - ATC \cdot Q = (12 - 4)40 \;\Rightarrow\; \boxed{\pi = 320}$$

# Example 3

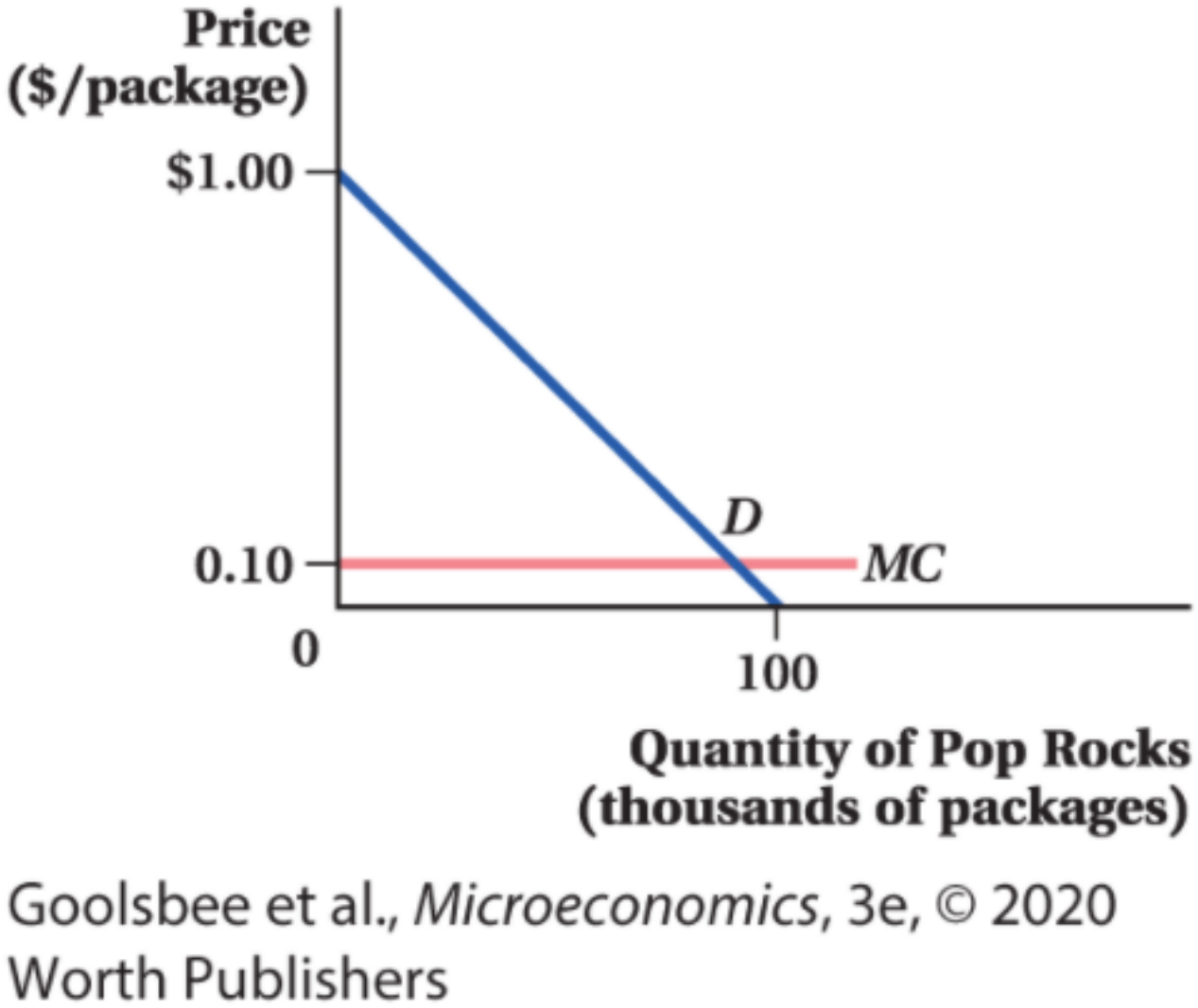



**Figure:** Pop Rocks market demand, example 3

# Example 3

Consider the market for Pop Rocks depicted in the previous figure

- If the Pop Rock industry were competitive, what would the competitive price and quantity be?

The optimal condition for a competitive market is $P = MC$

$$\boxed{P = 0.10}$$

To find quantity we substitute this price in the inverse demand function

$$\frac{1}{10} = 1 - \frac{1}{100}Q \Rightarrow \frac{1}{100}Q = \frac{9}{10} \Rightarrow \boxed{Q = 90}$$

# Example 3

- If the Pop Rock industry were competitive, what would the consumer and producer surpluses be, respectively?

$$CS = (\frac{1}{2}) * (90,000) * (\frac{9}{10}) \Rightarrow \boxed{CS = 40,500}$$

$$PS = (\frac{1}{2}) * (90,000) * (0) \Rightarrow \boxed{PS = 0}$$

# Example 3

- Suppose that gangland figure Tommy Vercetti monopolizes the Pop Rock market. What quantity and price would he choose to maximize profit?


**Figure:** Monopolist demand, example 3

# Example 3

First find the $MR$ deriving $TR$ with respect to $Q$

$$TR = P(Q) \cdot Q = (1 - \frac{1}{100}Q) * Q = Q - \frac{1}{100}Q^2$$

$$MR = \frac{dTR(Q)}{dQ} = \frac{d(Q - \frac{1}{100}Q^2)}{dQ} = 1 - \frac{1}{50}Q$$

Then use the optimal condition $MR = MC$

$$1 - \frac{1}{50}Q = \frac{1}{10} \Rightarrow \frac{1}{50}Q = \frac{9}{10} \Rightarrow \boxed{Q = 45}$$

Finally, find the monopoly price substituting the optimal quantity in the demand equation

$$P = 1 - \frac{1}{100}(45) \Rightarrow \boxed{P = 0.55}$$

# Example 3

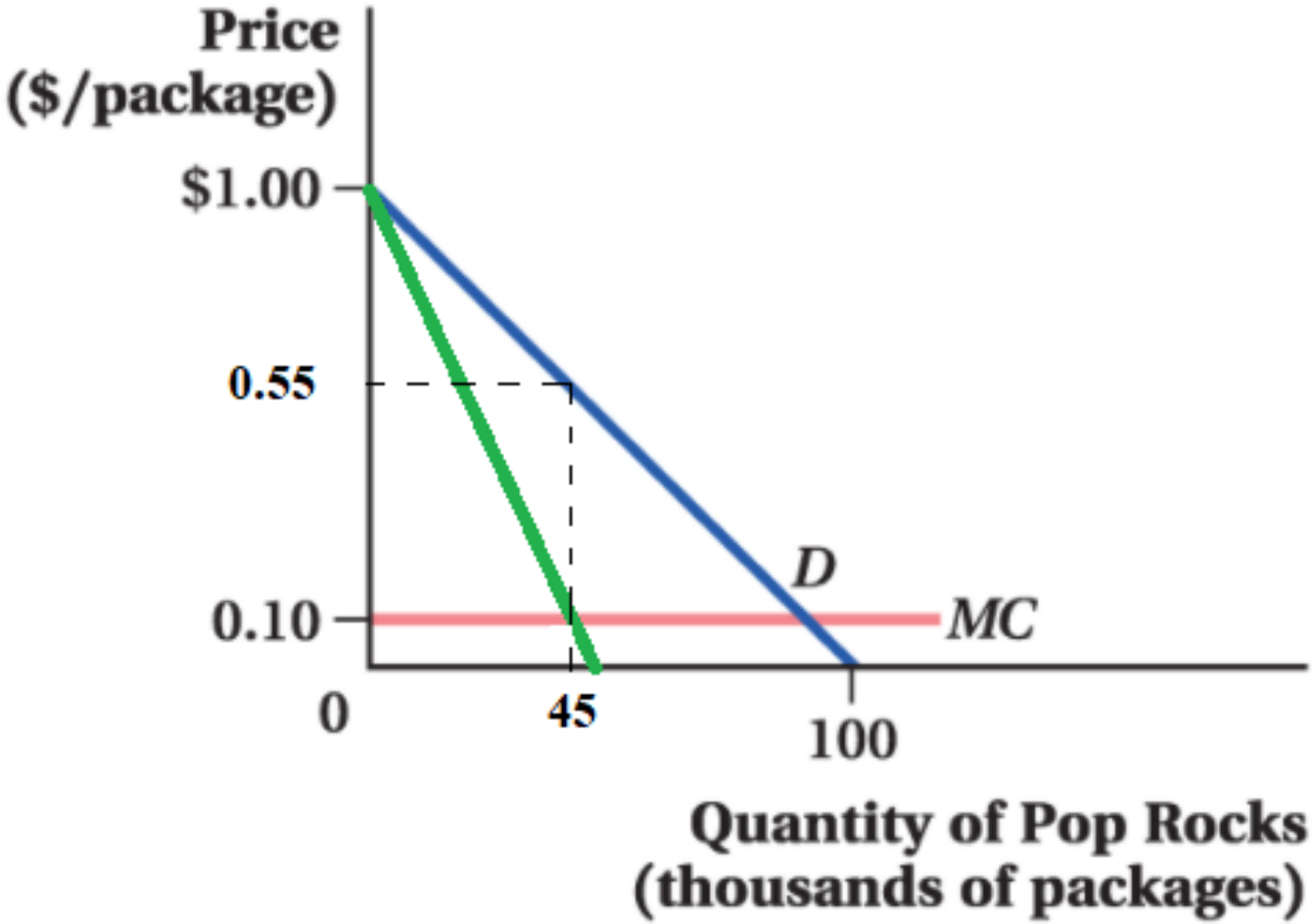



**Figure:** Monopolist price and quantity, example 3

# Example 3

- Calculate the consumer and producer surpluses of Vercetti's Pop Rock monopoly

$$CS = (\frac{1}{2}) * (45,000) * (0.45) \Rightarrow \boxed{CS = 10,125}$$

$$PS = (45,000) * (0.45) \Rightarrow \boxed{PS = 20,250}$$

- How big is the deadweight loss caused by the monopoly?

$$DWL = (\frac{1}{2}) * (45,000) * (0.45) \Rightarrow \boxed{DWL = 10,125}$$