An Introduction to Economics

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Oligopoly: Motivating Example

- Two firms, Macrosoft and Orange are the sole producers of a single product in the market.

- Each firm is large enough to individually impact prices in the market.

- What factors contribute to the choices made by each firm?

- How can a firm gain an advantage over the other?

Oligopoly

- The market is populated by a small number of firms, each with a large amount of market power

- Tend to produce differentiated products in order to capture heterogeneous consumers

- Market power allows the firms to charge prices above marginal cost.

- Outcomes are generally inefficient.

Oligopoly: Inefficiencies

- The opportunity for collusion arises.
  - Sherman Act strictly forbids collusion among firms in a market
  - There are many ways that modern firms circumvent these laws

- Market concentration has been steadily rising in 75% of U.S. industries in the last two decades[1]

- "U.S. Antitrust is in shambles" - Joseph Stiglitz

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[1] Gustavo Grullon, Yelena Larkin and Roni Michaely. 2019. Are U.S. Industries Becoming More Concentrated? *Review of Finance* 23, 4 (February 2019), pp.697-743

Example: Cournot Competition

- Two firms, A and B, each decide a quantity to produce in the market.
- Demand in the market is given by

$$P = 10 - \frac{q_A + q_B}{5}$$

- Each firm needs to choose their quantity to maximize profit, but the price is determined by the production of *both* firms.
- So each firm needs to take their competitor's production into account when making a decision.
- Suppose that each firm has a constant marginal cost of \$3.
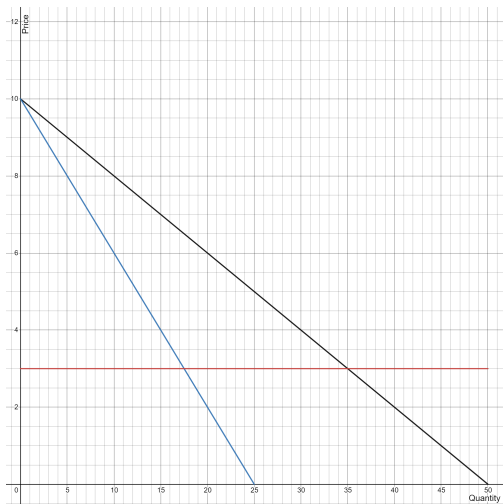
Monopoly Case

Figure 1: Demand (black), marginal revenue (blue) and marginal cost (red)

Example: Continued

- We see that the monopoly quantity is $\frac{35}{2}$ units.

- This is much lower than the efficient quantity of 35 units.

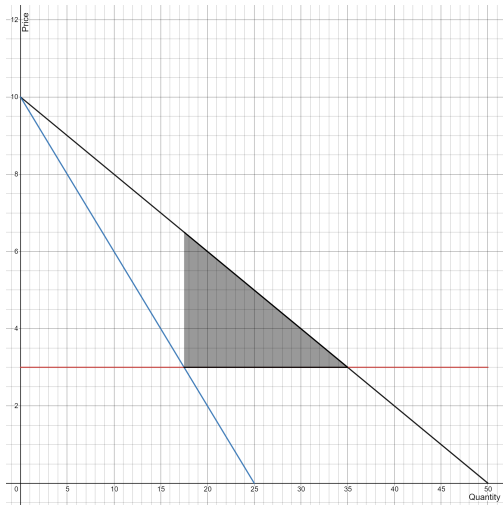- Where is the deadweight loss due to the monopoly outcome in this figure?

Figure 2: Deadweight loss (gray)

Oligopoly Outcome

- Let's put ourselves in firm A's shoes. If firm B is choosing some quantity q_B, what quantity q_A maximizes profit?
- Well, what does out marginal revenue curve look like?
- Remember, we know the relationship between price and total production as:

$$P = 10 - \frac{q_A + q_B}{5}$$

- Well, we can take q_B as given and use the demand curve as:

$$P = (10 - \frac{q_B}{5}) - \frac{q_A}{5}$$

Oligopoly Strategies

- So let's suppose that $q_B = 10$
- Firm A then faces the following demand curve:

$$P = (10 - 2) - \frac{q_A}{5}$$

- So we can find our marginal revenue curve, since we know it will have twice the slope of this demand curve.

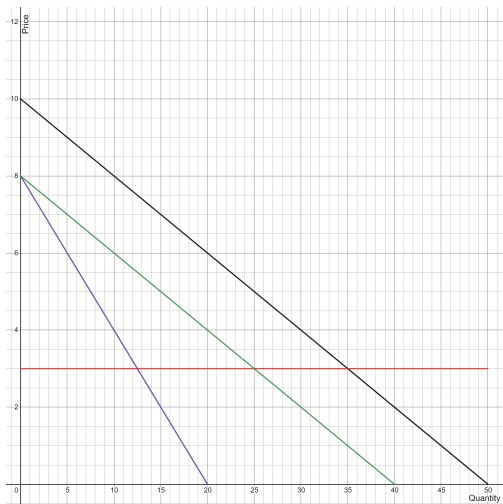$$P = 8 - \frac{2q_A}{5}$$

Oligopoly Strategies (Cont'd)

Figure 3: Firm A's demand (green) and marginal revenue (purple) when $q_B = 10$

Oligopoly: Optimal Quantities

- So we know that we can find firm A's profit-maximizing quantity if they know what firm 2 is doing.
- We can plot this optimal quantity q_A as a function of q_B.
- This gives us a curve that shows, for every quantity of q_B (on the y-axis) for firm B, the optimal quantity q_A (on the x-axis) that firm A should choose in response.
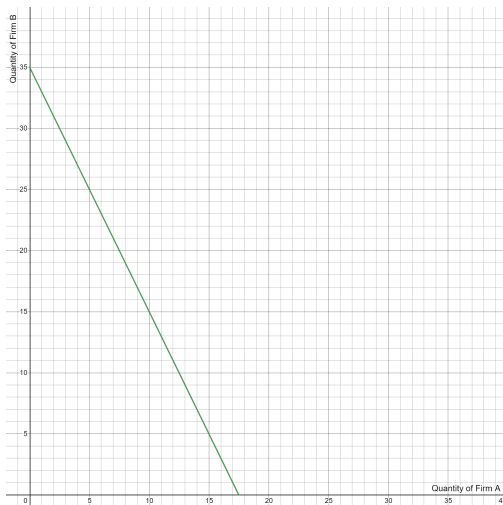
Figure 4: Firm A's optimal quantity in response to Firm B's quantity

- Notice that when $q_B = 0$, firm A will choose the monopoly quantity.

- When $q_B \geq 35$, then firm A should choose to produce nothing!

- When can also sketch the same curve for firm B! This should look quite similar to the curve for firm A.
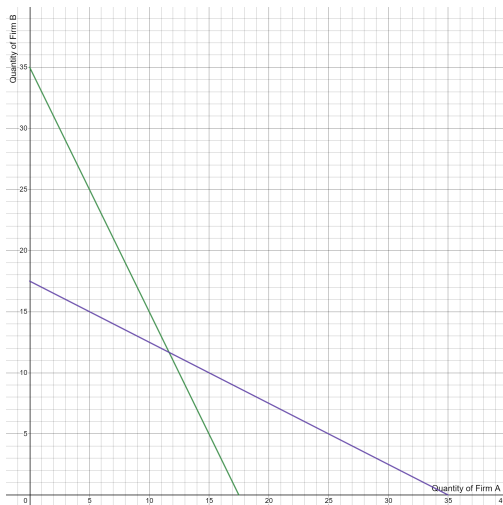
Figure 5: Firm B's optimal quantity q_B as a function of firm A's quantity (purple)

Oligopoly: Equilibrium

- What happens when the purple and green curves intersect?
- Well, firm A is choosing the profit-maximizing quantity given firm B's quantity.
- And firm B is choosing their profit-maximizing quantity given firm A's quantity.
- Both firms are choosing profit maximizing quantities given their respective marginal revenue curves. Equilibrium!
- In this example, the equilibrium quantity is $\frac{35}{3}$ for each firm. So total quantity is $\frac{70}{3}$
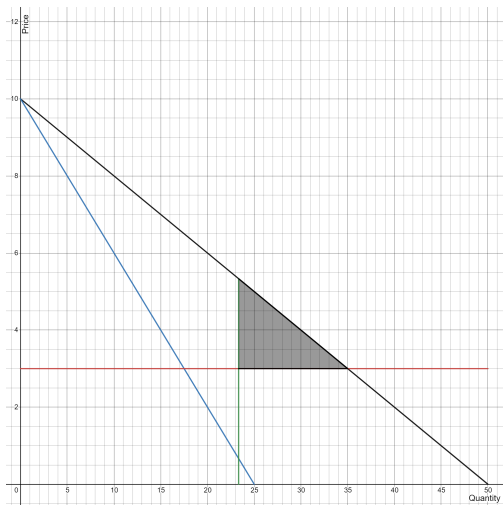- This is higher than the equilibrium quantity of $\frac{35}{2}$.

Figure 6: Deadweight loss at Cournot equilibrium (gray)