

Intermediate Microeconomics

Chapter 28: Oligopoly

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Oligopoly

A monopoly is an industry consisting a single firm.

↑ 垄断

两强垄断

A duopoly is an industry consisting of two firms.

寡头垄断

An oligopoly is an industry consisting of a few firms. Particularly, each firm's own price or output decisions affect its competitors' profits.

How do we analyze markets in which the supplying industry is oligopolistic?

Consider the duopolistic case of two firms supplying the same product.

Quantity Competition

Assume that firms compete by choosing output levels.

If firm 1 produces q_1 units and firm 2 produces q_2 units then total quantity supplied is $q_1 + q_2$. The market price will be $p(q_1 + q_2)$.

The firms' total cost functions are $c_1(q_1)$ and $c_2(q_2)$

Suppose firm 1 takes firm 2's output level choice q_2 as given. Then firm 1 sees its profit function as

$$\pi_1(q_1; q_2) = p(q_1 + q_2)q_1 - c_1(q_1)$$

Given q_2 , what output level y_1 maximizes firm 1's profit?

Quantity Competition: An Example

Suppose that the market inverse demand function is

$$p(Q) = 60 - Q$$

and that the firms' total cost functions are

$$c_1(q_1) = q_1^2 \text{ and } c_2(q_2) = 15q_2 + q_2^2$$

Then, for given q_2 , firm 1's profit function is

$$\pi_1(q_1; q_2) = (60 - q_1 - q_2)q_1 - q_1^2$$

So, given q_2 , firm 1's profit-maximizing output level solves (i.e., firm 1's best response to q_2):

$$q_1 = ?$$

Similarly, we have

$$q_2 = ?$$

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So, given q_2 , firm 1's profit-maximizing output level solves (i.e., firm 1's best response to q_2):

$$q_1 = R_1(q_2) = 15 - q_2/4$$

$$(q_1^*, q_2^*) = (13, 8).$$

Similarly, we have

$$q_2 = R_2(q_1) = 45/4 - q_1/4$$

Quantity Competition: An Example

An equilibrium is when each firm's output level is a best response to the other firm's output level, for then neither wants to deviate from its output level.

A pair of output levels (q_1^*, q_2^*) is a Cournot-Nash equilibrium (古诺-纳什均衡) if

$$q_1^* = R_1(q_2^*) \text{ and } q_2^* = R_2(q_1^*)$$

So the Cournot-Nash equilibrium is

$$(q_1^*, q_2^*) = (13, 8)$$

Quantity Competition

Generally, given firm 2's chosen output level q_2 , firm 1's profit function is

$$\pi_1(q_1; q_2) = p(q_1 + q_2)q_1 - c_1(q_1)$$

and the profit-maximizing value of q_1 solves

$$\frac{\partial \pi_1}{\partial q_1} = p(q_1 + q_2) + q_1 \frac{\partial p(q_1 + q_2)}{\partial q_1} - c_1'(q_1) = 0$$

The solution, $q_1 = R_1(q_2)$, is firm 1's Cournot-Nash reaction to q_2 .

Similarly, $q_2 = R_2(q_1)$, is firm 2's Cournot-Nash reaction to q_1 .

Collusion 合謀

Q: Are the Cournot-Nash equilibrium profits the largest that the firms can earn in total?

A: There are profit incentives for both firms to “cooperate” by lowering their output levels.

This is collusion.

Firms that collude are said to have formed a cartel. If firms form a cartel, how should they do it?

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Chapter 32: General Equilibrium and Exchange

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General Equilibrium

How are prices and quantities simultaneously determined in an economy.
(i.e., all markets)

We simplify analysis (2×2 model):

2 goods (x, y), 2 consumers (A, B), and endowments (w^x, w^y)

Consumers' utility: $u_A(x_A, y_A)$, $u_B(x_B, y_B)$

Initial endowments of x & y. For A: (w_A^x, w_A^y) ; For B: (w_B^x, w_B^y)

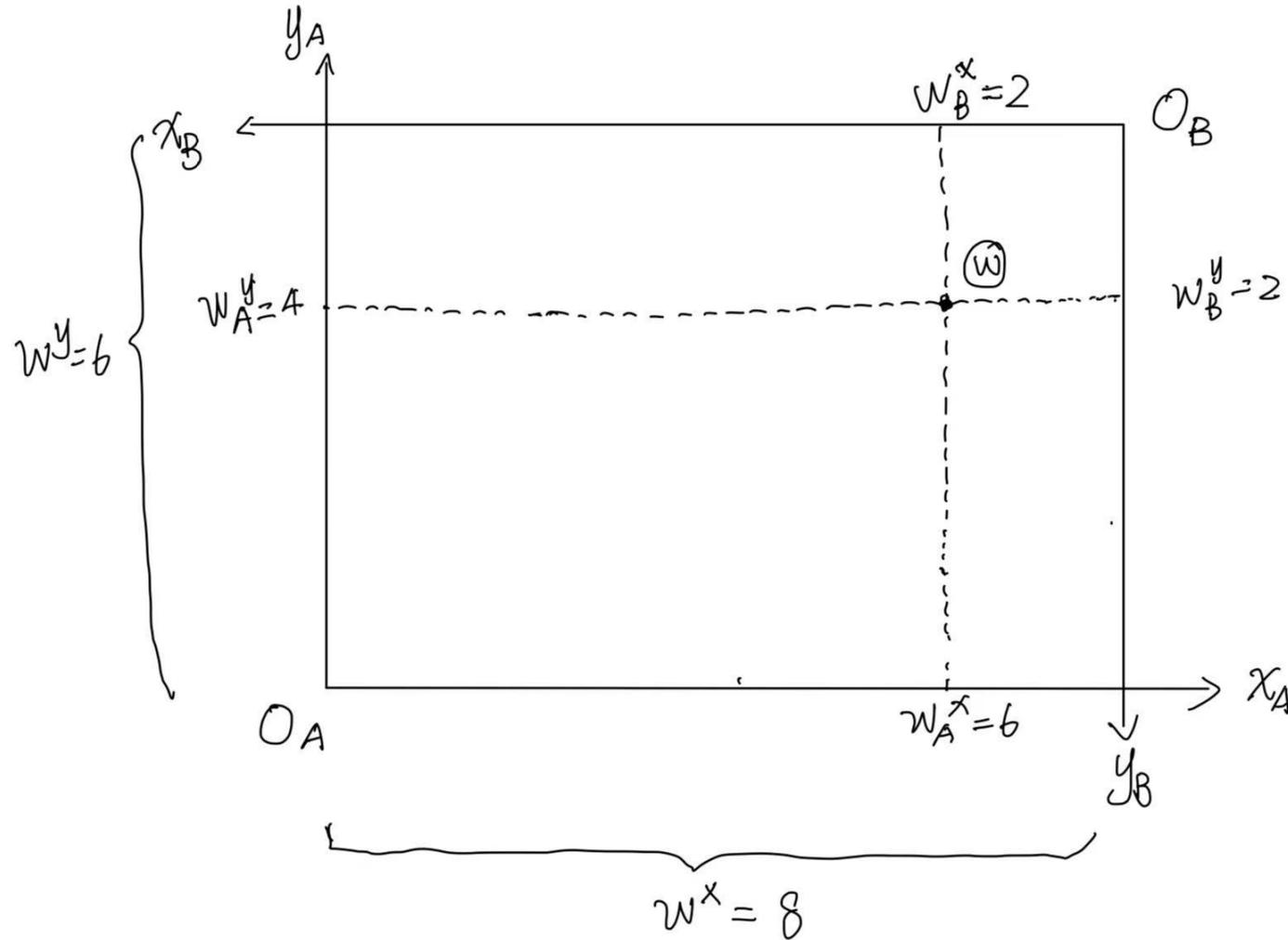
An allocation $\{(x_A, y_A), (x_B, y_B)\}$ is feasible if

For good x: $x_A + x_B = w_A^x + w_B^x = w^x$

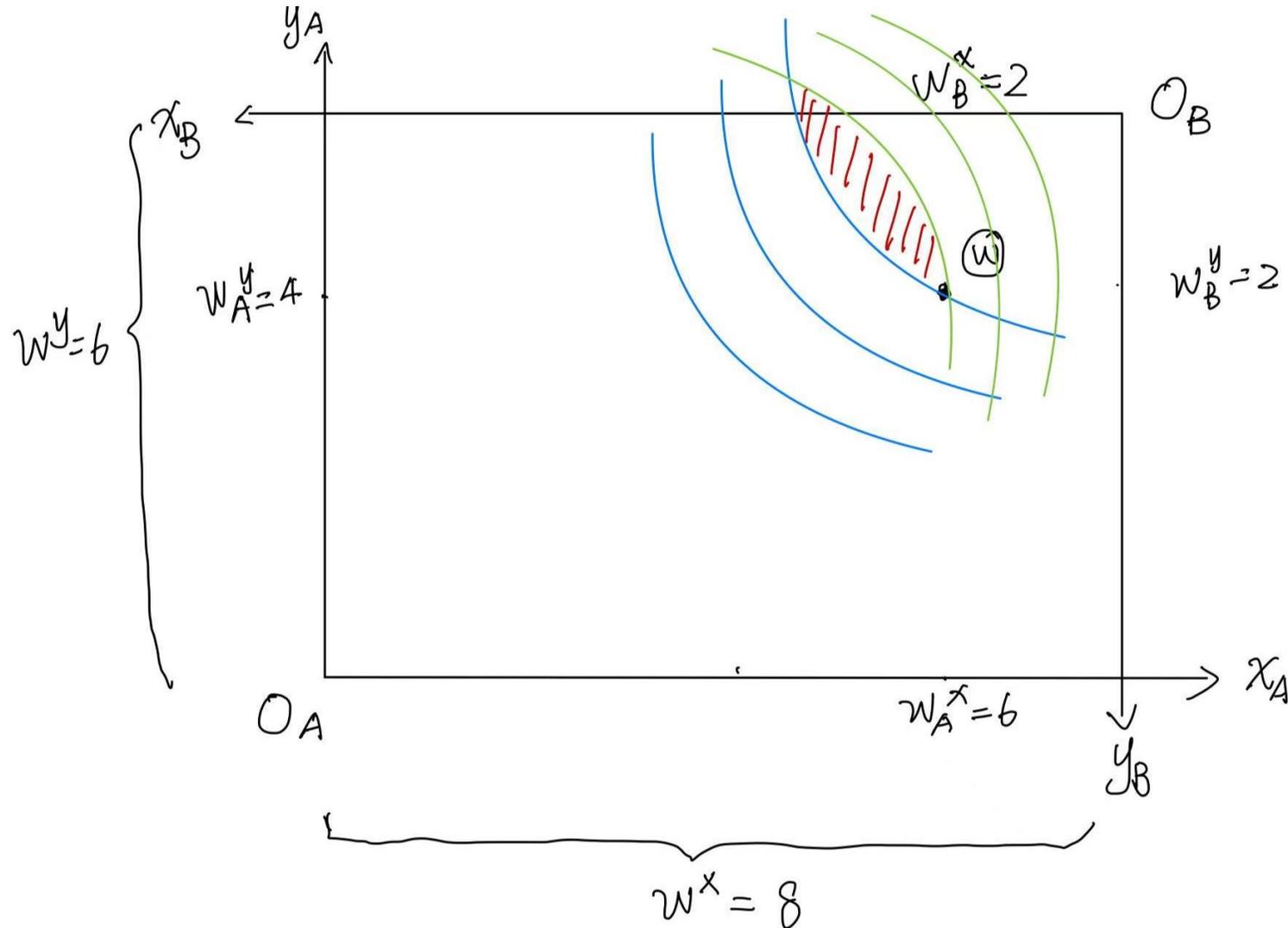
For good y: $y_A + y_B = w_A^y + w_B^y = w^y$

* Intuition: Demand=Supply in both markets (Market clearing conditions)

Edgeworth Box



Edgeworth Box



Pareto Efficiency

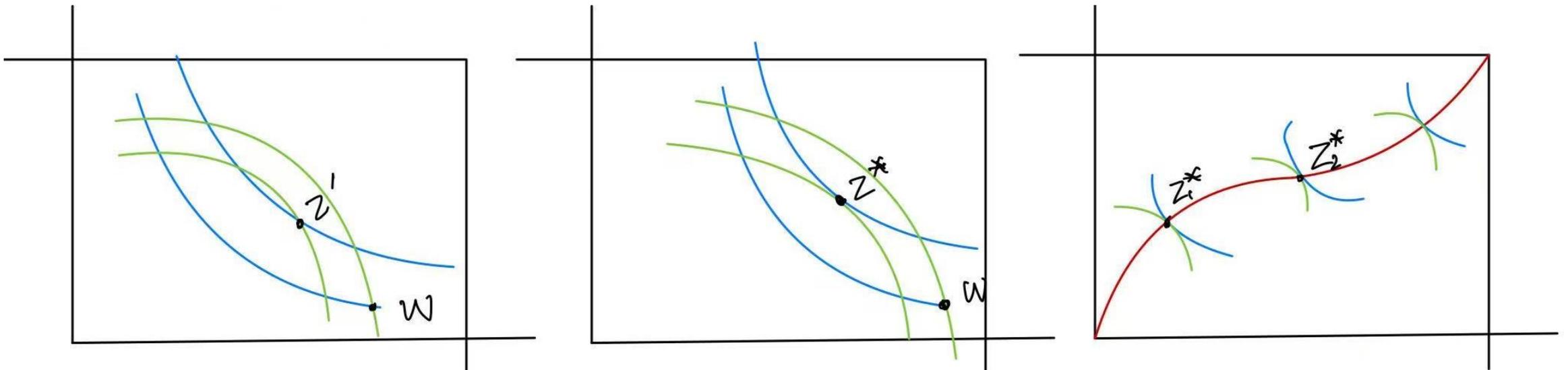
In general, equilibrium will be efficient, but, how to formalize?

Pareto Improvement: It makes at least one person better off, and nobody worse off.

Pareto Efficiency: (1) Feasible, (2) No further pareto improvement possible

For any interior Pareto Efficient allocation: $MRS_A = MRS_B$

Contract curve: Set of all Pareto Efficient allocation



Competitive equilibrium

Set of prices (p_x^*, p_y^*) and allocation $(x_A, y_A), (x_B, y_B)$ such that:

- (1) All consumers maximize utility
- (2) Markets clear (demand=Supply) in aggregate terms

First welfare theorem: Every competitive equilibrium (CE) is Pareto Efficient (PE)

In other words: Allowing free market competition can maximize efficiency

Second welfare theorem: Can set prices and endowments such that any Pareto Efficient allocation (PE) is a competitive equilibrium (CE)