Course outline I

- Introduction
- Game theory
- Price setting
  - monopoly
  - oligopoly
- Quantity setting
  - monopoly
  - oligopoly
- Process innovation

Homogeneous goods

Price competition

- Case study: AMXCO versus Vebco
- Simultaneous price competition
  - Equal costs ✹ Bertrand paradox
  - Different costs ✹ Blockade, deterrence
  - Old customers, switching costs
- Price cartel
- Minimum-price guarantees
- Executive summary

Example: AMXCO versus Vebco

- Cooler pads, used in air conditioning equipment, traditionally made by hand.
- Around 1960 AMXCO developed a method of producing cooler pads by machine and became the leading firm in the market.
- Vebco distributed pads for AMXCO. When Vebco began to distribute its own hand-made cooler pads a price war followed:

(Industrial Economics; Stephen Martin)

Price war

	Vebco	AMXCO
1969	- began to distribute its own pads	
		- terminated Vebco as a distributor
	- gradually gained market share	
Jan. 1971	- charged price 9,5 % below list	
		- followed, not to lose market share
	- cut price to 14,5 % below list	
		- cut price to 25 % below list
	- matched AMXCO price cut	
		- cut price to 32,5 % below list
March 1971	- matched AMXCO price cut	
March 29, 1971	- raised price to 25 % below list	
1972		- offered discounts of 19 - 25 % below list

(Industrial Economics; Stephen Martin)

Discussion (1)

- AMXCO, a dominant firm with cost advantage over fringe firms, set its price so close to list that it was profitable for Vebco to expand its output, even though Vebco had higher costs. A price war followed until Vebco “sued for peace”. AMXCO remained a dominant firm, but competition forced it to set lower prices.

(Industrial Economics; Stephen Martin)

Discussion (2)

- Vebco filed a private antitrust suit against AMXCO, alleging price discrimination in violation of the Clayton Act and attempted monopolization in violation of Sect. 2 of the Sherman Act.
- A court found in favor of AMXCO. There is no injury to competiton, if the price remains above the firm's average variable cost.

Antitrust laws and enforcement, the US

- laws
  - Sherman Act (1890)
  - Clayton Act (1914)
  - Federal Trade Commission Act (1914)
- enforcement
  - Department of Justice
  - Federal Trade Commission (FTC)

Excerpts from US Antitrust Statutes (1)

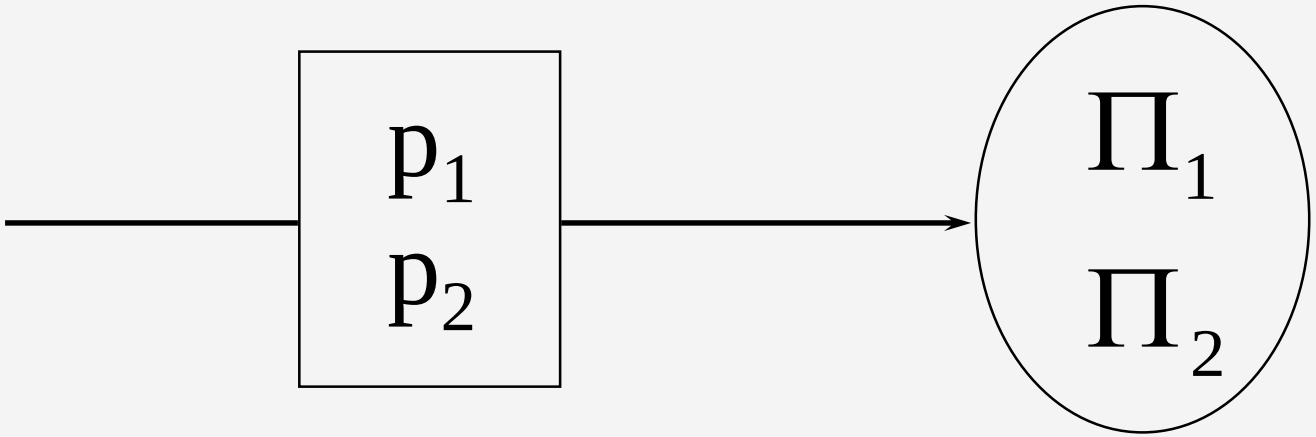
- Sherman Act
  - Section 1. Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is hereby declared to be illegal …. Every person who shall make any contract or engage in any combination or conspiracy hereby declared to be illegal shall be deemed guilty of a felony ….
  - Section 2. Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony ….

Excerpts from US Antitrust Statutes (2)

- Clayton Act
  - Section 2. (a) That it shall be unlawful for any person engaged in commerce … to discriminate in the price between different purchasers … where the effect of such discrimination may be substantially to lessen competition or tend to create a monopoly in any line of commerce, or to injure, destroy or prevent competition … nothing herein contained shall prevent differentials which make only due allowance for differences in the cost of manufacture, sale, or delivery ….

Competition in prices

- The Bertrand model as a simultaneous price competition:



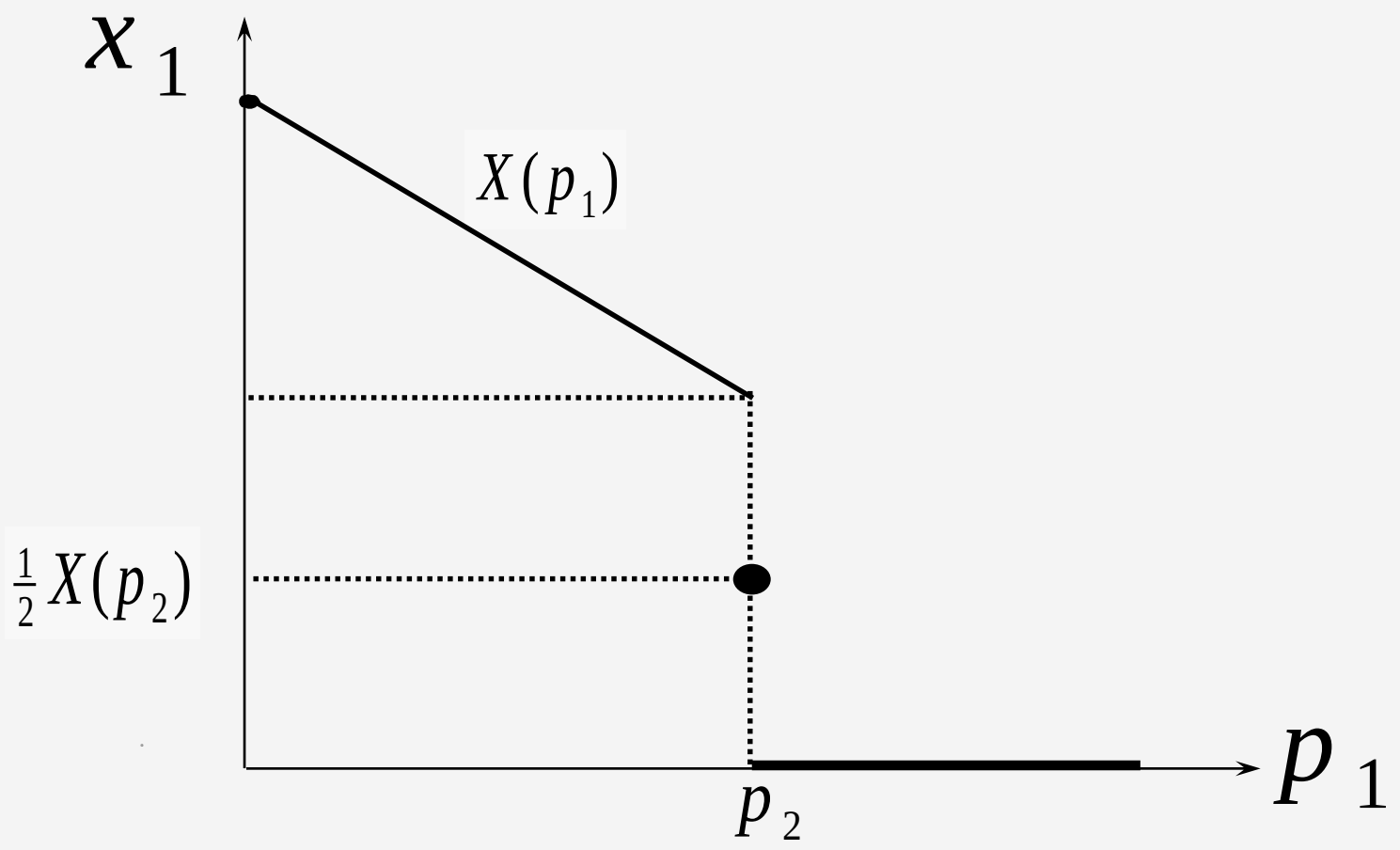
The Bertrand model

- Market demand function $X(p) = d - ep$
- Demand function of firm 1

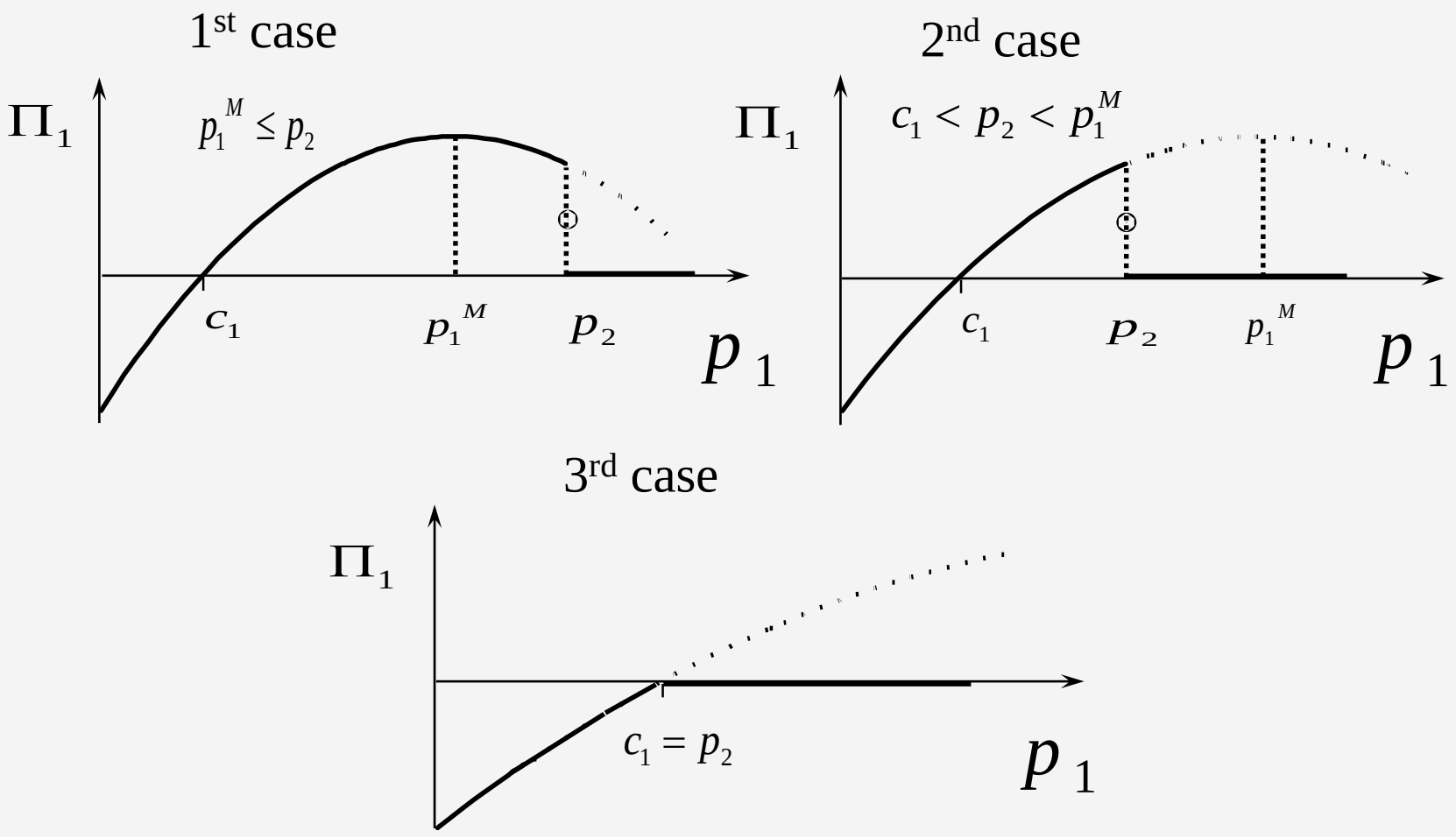
$$x_1 = \begin{cases} d - ep_1, & p_1 < p_2 \\ \dfrac{d - ep_1}{2}, & p_1 = p_2 \\ 0, & p_1 > p_2 \end{cases}$$

- Equal costs: $c_1 = c_2 = c$
- Different costs: $c_1 < c_2$

Demand function of firm 1



Profit function of firm 1



Equal costs ✹ Bertrand paradox

- $\left(p_1^B, p_2^B\right) = (c, c)$ is a Nash equilibrium in the Bertrand model with equal marginal costs.
- (c, c) is the only equilibrium.
  - $(c - \delta, \cdot)$
  - $(c + \delta, c + \delta)$
  - $(c + \delta, c + \gamma)$ *with* $\delta < \gamma$
  - $(c + \delta, c)$
- Marginal cost pricing and no profits!

Exercise (discrete prices)

- Assume discrete prices and monetary units (1$, 2$,...) as well as equal marginal costs c=10.
- Find the Bertrand-Nash equilibria.

Ways out of the Bertrand-paradox I

- Discrete prices
- Capacity constraints
  - Assumption : $\frac{1}{2}X(c) < capacity_2 < X(c)$
  - Is (c,c) an equilibrium?
- Repeated play
  - $(c+\delta, c+\delta)$ is not an equilibrium in the one-shot game,
  - but may be sustained as an equilibrium of repeated game.

Ways out of the Bertrand-paradox II

- Cost leadership ✹ Blockade or deterrence
- Old customers, switching costs
- Price cartel
- Minimum-price guarantees
- Product differentiation

Entry barriers

- Free entry tends to drive profits down.
- Entry barriers allow established firms to make profits without attracting competitors.
- Entry barriers
  - government regulation (licences)
  - structural barriers (cost disadvantages)
  - strategical barriers (limit price, limit quantity)

Blockade, Deterrence, or Accomodation

- Blockaded entry: There is no threat of entry even if established firms maximize profits.
- Deterred entry: Established firms try to make entry unattractive to potential competitors.
- Accommodated entry: Established firms do not deter entry and potential competitors become actual competitors.

Different costs $(c_1 < c_2)$ Blockade or deterrence? I

- Blockaded entry for both firms

  $c_1 \geq \frac{d}{e} \quad and \quad c_2 \geq \frac{d}{e}$

- Blockaded entry of firm 2:

  $c_2 > p^M(c_1) = \frac{1}{2}\left(\frac{d}{e} + c_1\right) \quad and \quad c_1 < \frac{d}{e}$

  Bertrand-Nash equilibrium:

  $\left(p^M(c_1), c_2\right)$

  Are there other equilibria?

Different costs $(c_1 < c_2)$ Blockade or deterrence? II

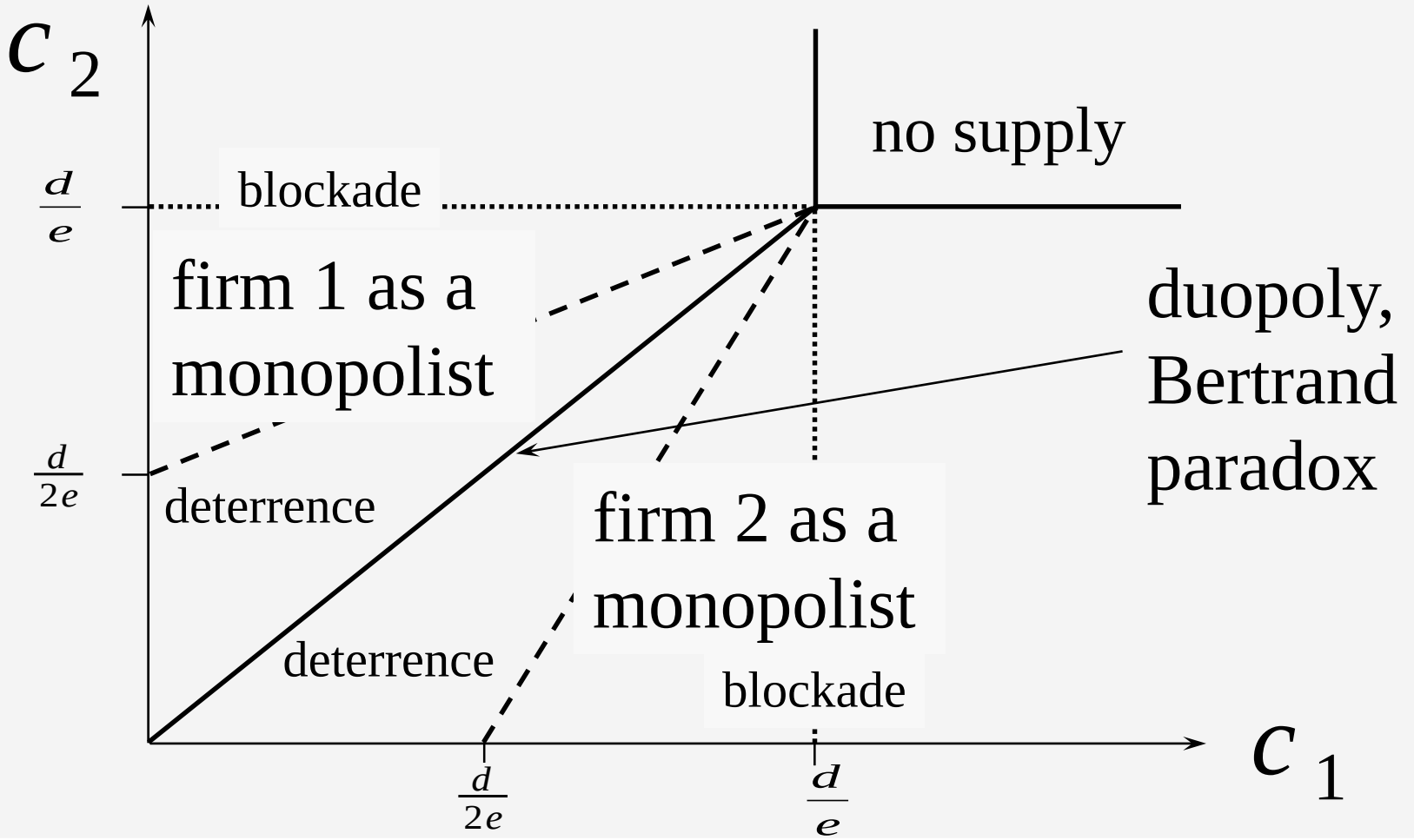
- Deterrence of firm 2:

$$c_2 \leq p^M(c_1) = \frac{1}{2}\left(\frac{d}{e} + c_1\right) \quad and \quad c_1 < \frac{d}{e}$$

Bertrand-Nash equilibrium:

$$\left(p_1^L(c_2), c_2\right) = (c_2 - \varepsilon, c_2)$$

Blockade, deterrence and Bertrand paradox



Old costumers - switching cost

- Repeat purchase ✹ switching costs
- Sources:
  - learning processes (opportunity costs of time and direct costs)
  - transaction costs
  - strategic design by firms (bonus program)

Switching costs - examples

- In the middle of the 1980s AT&T succeeded in becoming the supplier of digital switches (5ESS) to Bell Atlantic. From then on, all the changes in Bell Atlantic's telephone system had to be provided by, and negotiated with, AT&T.
- My tax consultant closed his office and sold his customer data to another tax consultant.
- My bank closed the office I used to frequent.

The model with switching costs

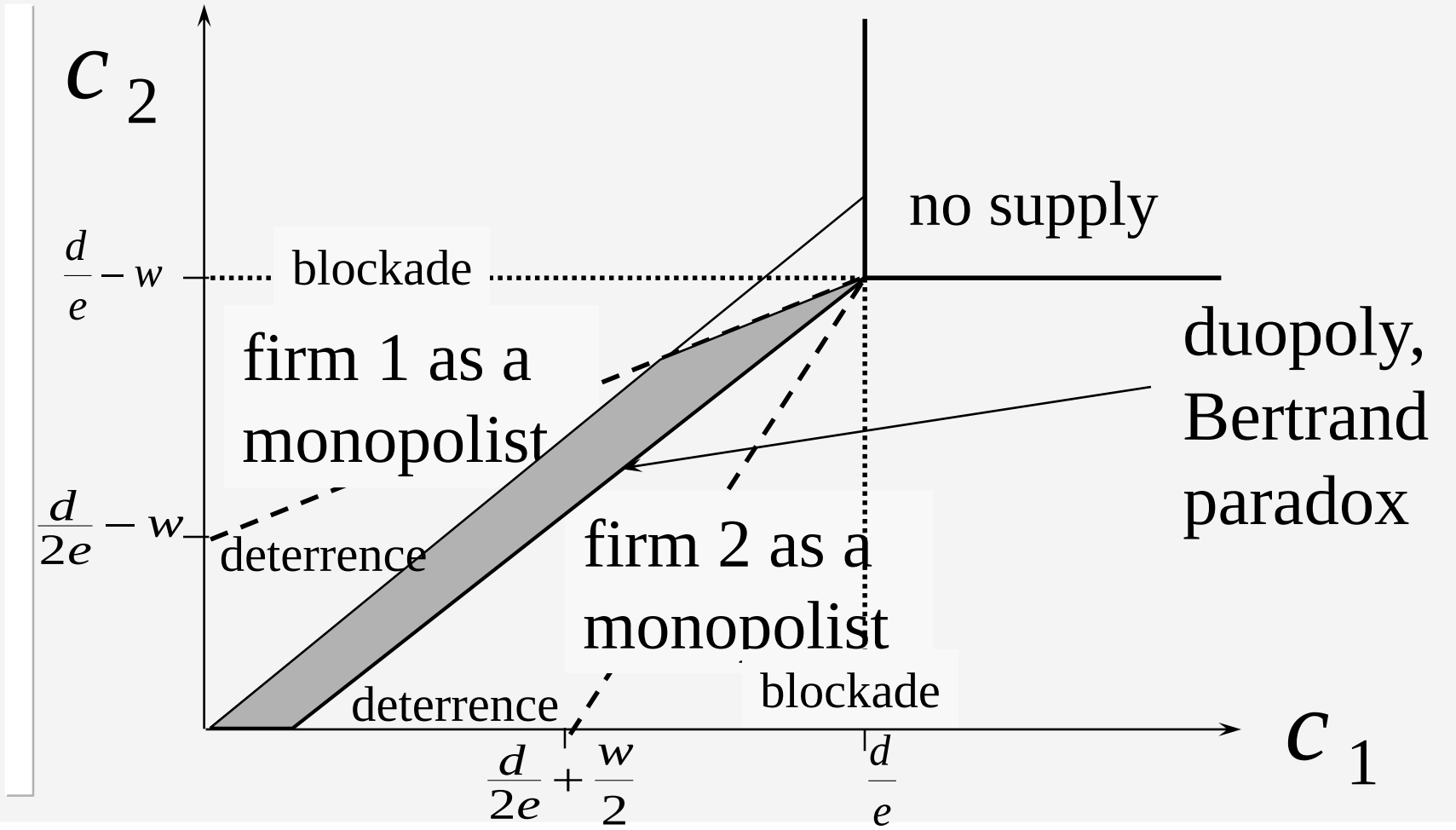
- All costumers are old costumers of firm 1
- Demand function of firm 1

$$x_1 = \begin{cases} d - ep_1, & p_1 < p_2 + w \\ \dfrac{d - ep_1}{2}, & p_1 = p_2 + w \\ 0, & p_1 > p_2 + w \end{cases}$$

- deterrence of cost leader (firm 2) possible if:

$$c_1 < \frac{d}{e} \quad and \quad c_2 < c_1 < c_2 + w < p_1^M(c_1)$$

Switching costs - blockade, deterrence and Bertrand paradox



Worth of old costumers I

- Unit costs are $c_1 = c_2 = c$
- Worth of old costumers

  = Profit with switching costs –

  Profit without switching costs:

  $\Delta_1 = \Pi_1^{with\ sw.c.} - \Pi_1^{without\ sw.c.}$
- The profit without switching costs corresponds to the profit of Bertrand competition with equal costs: $\Pi_1^{no.c.} = \Pi_1^B = 0$

Worth of old costumers II

$$\Delta\Pi = \Pi_1^{\text{with sw. c}} - \Pi_1^{\text{without sw. c}}$$

at $c_1 = c_2$

$$\Delta\Pi = \Pi_1^{\text{with oc}} - \Pi_1^{\text{B}} = \Pi_1^{\text{with oc}} - 0$$

$$= \left(p_1^L(c_2 + w) - c_1\right) \cdot x_1\left(p_1^L, c_2 + w\right)$$

$$= \left(c_2 + w - \varepsilon - c_1\right) \cdot x_1\left(c_2 + w - \varepsilon, c_2 + w\right)$$

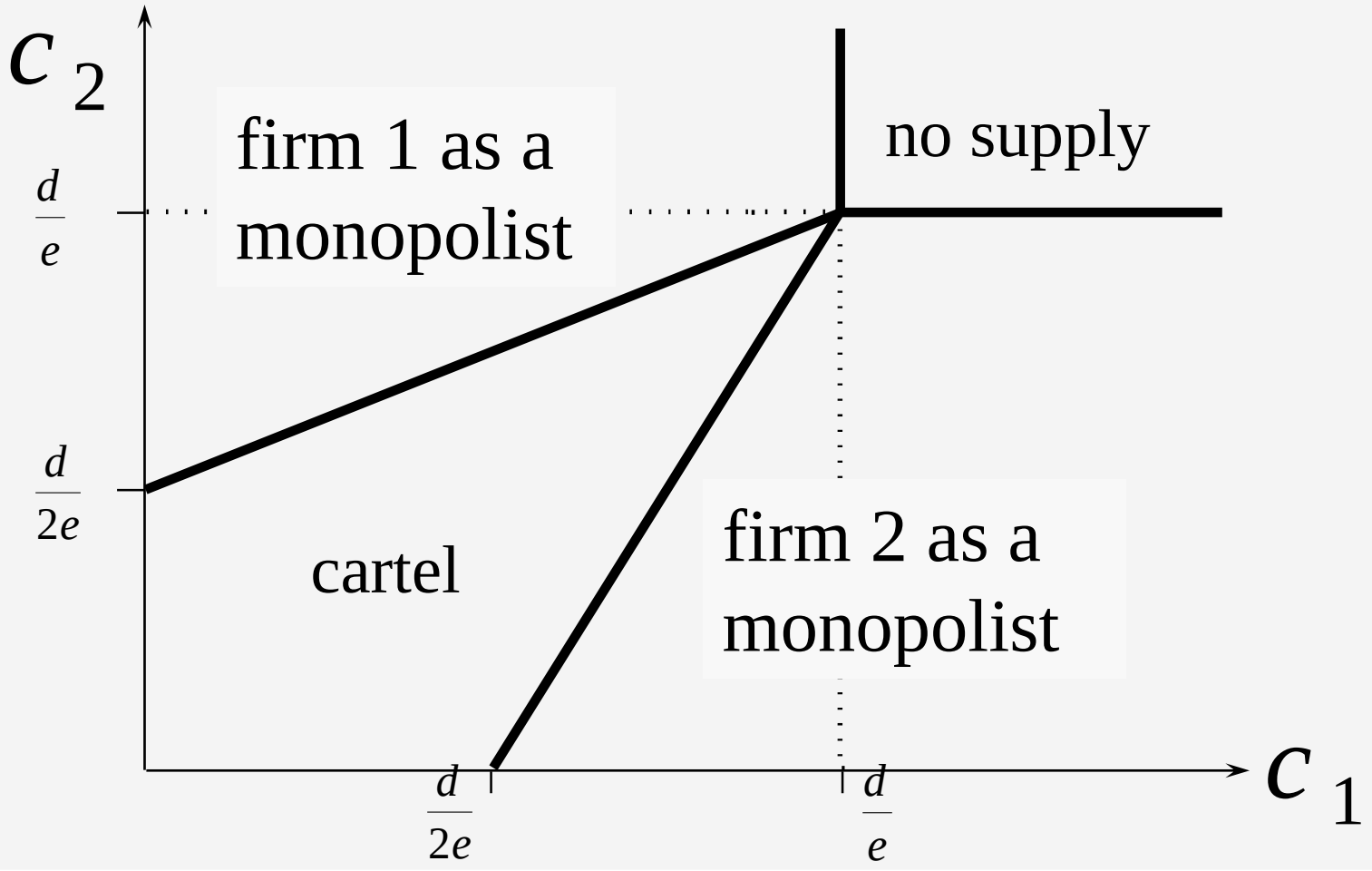
$$= \left(w - \varepsilon\right) \cdot X\left(c_2 + w - \varepsilon\right)$$

$$\approx w \cdot X\left(c_2 + w\right)$$

Price cartel

- For sufficiently small cost differences (Bertrand paradox or deterrence), a cartel might be established.
- There are strong incentives to deviate from the cartel prices.

The cartel, graphically



Exercise (price cartel)

Consider two firms competing in prices. The demand function is given by $X(p)=20-2p$.

Suppose that the equal and constant unit costs are given by 6.

a) Find the optimal cartel price.

b) Assume equitable devision of profits. Calculate the maximum profit difference firm 1 could achieve by deviating.