Regulation Policy and Economics of Regulation
Class No. 6 (file 6): Network Externalities

Objectives of Today's Class

(1) To understand the concept of network externalities
(2) To understand the relationship between switching cost and competitive structure

Outline of Class No. 6

6-1 Network Externalities
6-2 Network Externalities and Competition
6-3 Switching Cost
6-4 Switching Cost and Competition
6-5 Standardization and Compatibility

Network Externalities

・A phenomenon that the value to a user of connecting to a network enhances with the increase of the number of other persons who are in the network.

→ The range of application of this has been extended to indicate “a phenomenon in general that the larger the number of persons who acquire the same good and service grows, the bigger their value to these users becomes.”

Examples of Network Externalities

(1) Telephone, facsimile, electronic mail
(2) HP, portal site, blog
(3) Game machine, video, DVD, standards on cellphone
(4) Computer operating software, application software
(5) Character array of keyboard
(6) Standards on fuel cell
(7) Language in use
(8) Scholarly journal's ranking

Phenomena to Occur in Markets with Network Externalities

(1) Merit of scale (Marshall's external economies)

→ Severe competition in the early stage

→ Monopoly in the end ～ Realm of "winner takes all"

(2) Multiple equilibria

- Excess Inertia (reluctant to switch contrary to the propriety of change essentially)
- Excess Mobility (quick to switch contrary to the propriety of no change essentially)

Pure Coordination Game

1 \ 2	C	D
C	(2, 2)	(0, 0)
D	(0, 0)	(1, 1)

Question: What is Nash equilibrium?

Pure Coordination Game

		2 C	2 D
1	C	（2，2）	（-100，-1）
	D	（-1，-100）	（1，1）

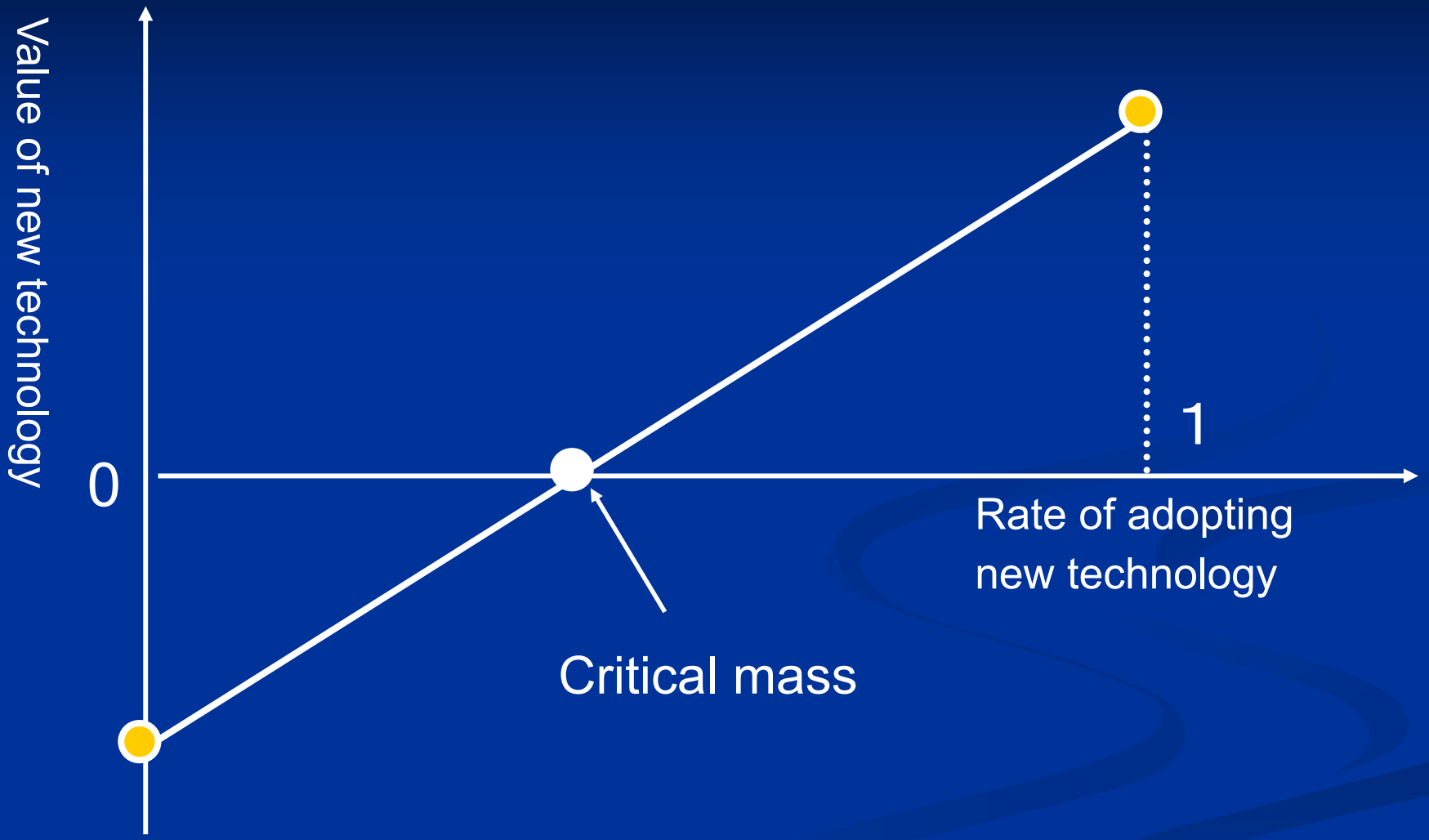
Question: What is Nash equilibrium?

Pure Coordination Game

		2 C	2 D
1	C	(2, 2)	(-100, -1)
	D	(-1, -100)	(1, 1)

Answers: (C,C), (D,D)

Pure Coordination Game in Crowd Version



Excess Inertia

C：Adopt new technology

D：Remain with current technology

The state of（D，D）in equilibrium.

Dynamic model

Remain with current technology ～ Unintended not to adopt new technology forever → Capable to switch any time in/after the next term → Advantage in switching after making sure that everyone has already changed so as to be able to enjoy network externalities.

⇒ If everyone takes the same strategy, there is no technological innovation for a long, long time. Matsumura and Ueda (1996)

Reasons for No Excess Inertia to Happen

Diffusion leveraging the market power

- Introductory price: the pricing being lowered just for now

⇒ To set a higher pricing when diffused

⇒ Able to eradicate consumers' "waiting" strategy

(which is difficult in the realm of perfect competition)

- To discontinue the supply of and support for the products of old technology

Diffusion of new technology led by new technology freaks

Presence of a mass having a strong preference for new technology

⇒ To constitute driving force to diffuse new technology

Excess Mobility

C : Remain with current technology

D : Adopt new technology

The state of (D, D) in equilibrium.

To emphasize an aspect that the product is “devised by the firm.”

(E.g.) Frequent version upgrade of software

Excess Mobility

A word-processing software gets upgraded.

~An old version cannot read a file created with a new version. ← Trend toward improvement these days

An operating software gets upgraded.

~The manual is changed to instructions supporting a new version, causing inconvenience to users of an old software.

⇒ Those consumers satisfied with an old version are forced to switch when other consumers shift to a new version.

⇒ Leading to the sale of more software and more gains of firms?

Excess Mobility

Those consumers satisfied with an old version are forced to switch when other consumers shift to a new version. ⇒ Leading to the sale of more software and more gains of firms?

If consumers rationally read this (i.e., being forced into high costs with frequent version upgrade), they lower their willingness to pay at the initial purchasing stage. (The original demand drops off.)

⇒Disadvantageous to producers alike

~ Producers' profits go up if they can commit against meaningless upgrading. (Common structure to the arguments regarding a tie-in sale, durable consumer goods, the principle of the lever) ~ Capable to function as a tool for price differentiation

Standardization

(1) Public institutions deliberately conduct standardization by developing norms. ~ de jure standard

(2) One norm turns out dominant, which grows into a standard. ~ de facto standard

Closely related to the discussion on network externalities

Excess inertia and excess mobility

There is no guarantee that a superb standard comes into wide use.

De Jure Standard and De Facto Standard

Some standards cannot be clearly distinguished between “de jure” and “de facto.”

- Academic societies of authority set standards and make approaches to respective firms for their adoption. ~ albeit no compelling force
- Standards are established in Europe, which get voluntarily adopted in respective countries (without compelling force).
- Public institutions confirm some standards that have become dominant.

Interchangeability

(1) Interchangeability of the parts of the identical products made by the same firm:

Disassemble 2 cars of the same model into pieces of parts, and reassemble them into 2 cars that move perfectly.

(2) To be able to use the products of the same standard beyond the difference of makers:

A videocassette recorder of a maker can take a videotape of another maker.

(3) Standardized parts able to be used between different products:

Standards of screws, pipes, building materials

(2) Realm of No Interchangeability (incl. one in the past)

- With Playstation, the software for X box unable to be used
- With Windows, the software for Mac unworking
- With Canon's printer, only Canon-made memory and cartridge compatible
- With Docomo's terminal, no services of *au* possible
- Docomo's terminal unable to be used in the U.S. (at the time of 2G)

Interchangeability and Competition

(Case with no interchangeability)

The realm where only a combination of Firm A's platform and Firm A's content, or that of Firm B's platform and Firm B's content, is workable.

(Case with interchangeability)

The realm where a combination of Firm A's platform and Firm B's content, and that of Firm B's platform and Firm A's content, are workable alike.

Which case is more competitive?

Interchangeability and Competition: Spatial Model

Duopoly: Each consumer expends on the combination of a single unit of a platform and that of a content. Each firm supplies both platforms and contents. ~ Inelastic demand: a two-dimensional version of the Helelling model discussed in file 2

(Case of no interchangeability)

Each consumer makes a choice as to from which firm to buy both a platform and content, Firm 1 or 2: One buys from a firm with a lower real price (price + travel cost) in total .

(Case of interchangeability)

Each consumer makes a choice as to from which firm to buy a platform, Firm 1 or 2, and apart from that decision, one makes another choice as to from which firm to buy a content, Firm 1 or 2: One buys from a firm with a respective lower real price.

Preference

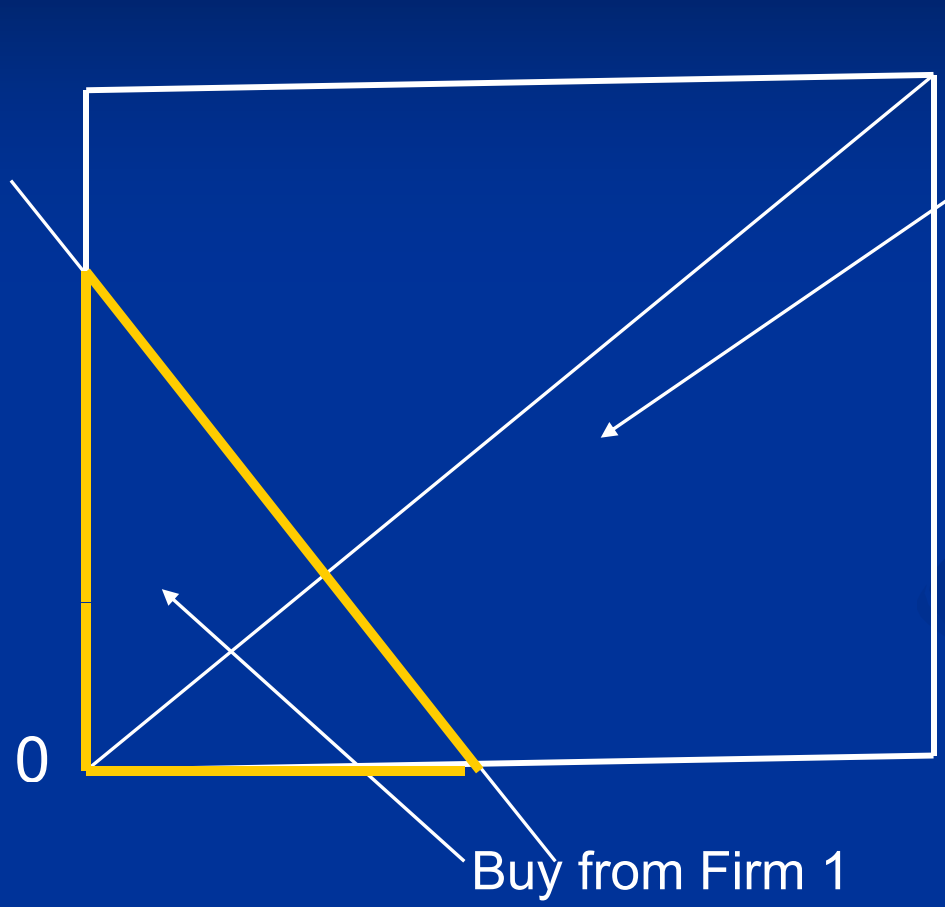
Preference for Firm 2's product

Preference for Firm 1's product

The horizontal axis to show preference of platform and the vertical axis that of content

Travel cost being in proportion to the square of the distance

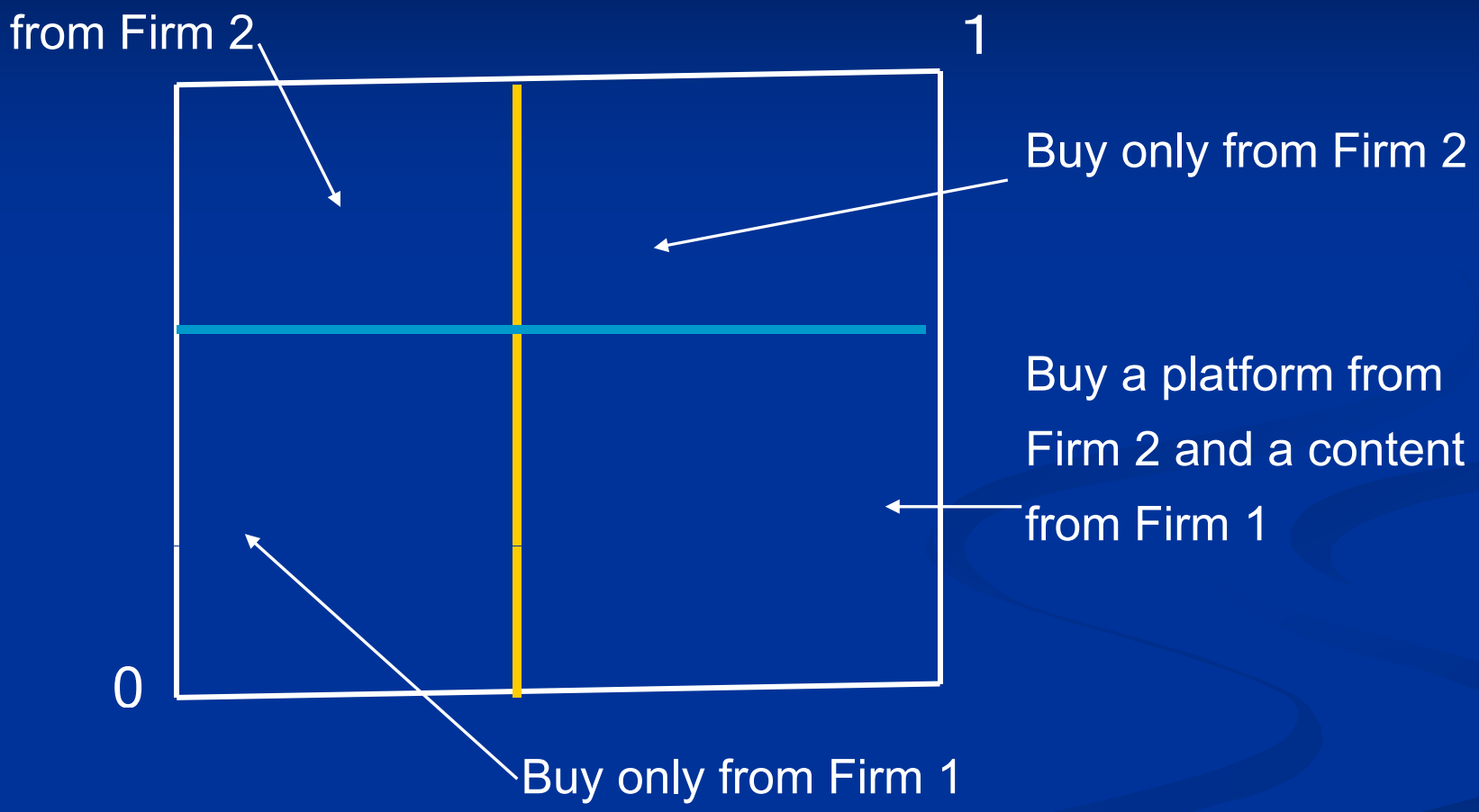
Not Interchangeable



The horizontal axis to show preference of platform and the vertical axis that of content

Travel cost being in proportion to the square of the distance

Interchangeable



Interchangeability and Competition

Question: Which is more competitive, a case of interchangeability or one of no interchangeability?

Merger and Competition

Question: Which case makes a competition more intense; Firm 1 and 2 are separated to one supplying only platforms and the other supplying only contents, or the two are consolidated? (Which case comes up with a lower equilibrium price?)

- No interchangeability
- Each consumer buys a single unit of both platform and content.
- To simultaneously set the prices for platforms and contents.
- No economic efficiency of confines as to production

Merger and Competition

Question: Consider a case of no interchangeability. Which case makes competition more intense; Firm 1 and 2 are separated to one supplying only platforms and the other supplying only contents, or the two are consolidated? (Which case comes up with a lower equilibrium price?)

Answer: In general, a merger of firms supplying complementary goods brings about lower prices.

Reason: By lowering the price of one party's goods, the other party's products sell well, too. → A case of consolidation gets induced to set a lower pricing.

Interchangeability and Competition

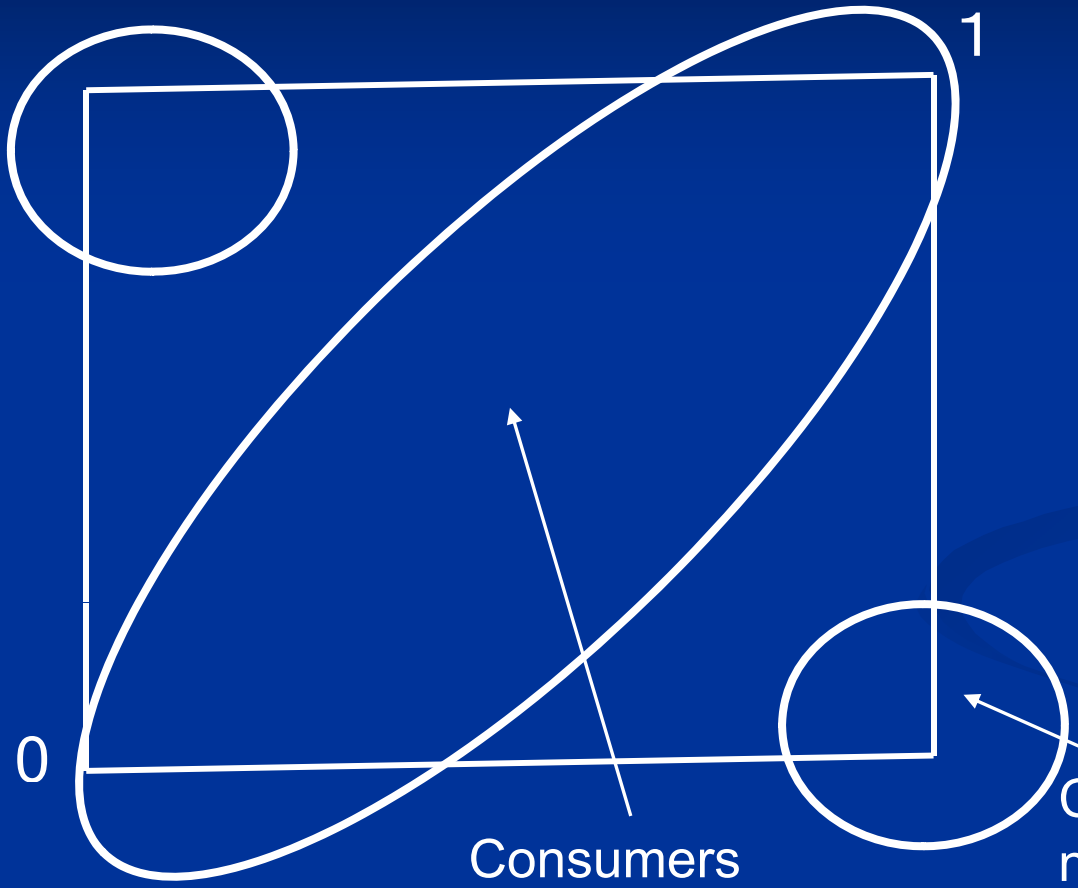
Question: Both Firm 1 and 2 supply both platforms and contents. Which case is more competitive, a case of interchangeability or one of no interchangeability? (Which case has an incentive to set a lower pricing?)

Answer: A case of no interchangeability has an incentive to set a lower pricing.

Reason: With no interchangeability, when a party's goods sell, the other's goods sell, too. → An incentive to steal customers by lowering the pricing

A price level becomes lower with incompatibility. （Matutes and Regibeau (1988))

Interchangeability and Consumer Benefit



Welfare Implications of Interchangeability

Interchangeability

→ Not all consumers gain benefits necessarily.

Welfare-improving effect of interchangeability

- With lax competition, a possibility for business income to increase
- Possibility for a more appropriate choice of products

Welfare-reducing effect of interchangeability

- Lax competition brings about underconsumption. ~ This effect is excluded by the assumption in this model (as every consumer acquires a single unit.)

Switching Cost

Cost associated with switching providers

(1) Cost required technically

(E.g.)

- Cost for purchasing new software and machinery
- Cost for movement proceedings
- Requirement of labor to master how to use new software and machinery
- Anxiety and uncertainty about quality

Switching Cost

(2) Cost devised artificially

(E.g.)

- Fine for breach of contract with cancellation of a contract before the agreed term, discount for a long term, mileage, and gradually increasing points

(3) Able to reduce switching cost artificially

(E.g.)

- Special discount for other firm's users (discount for switching)
- Purchase of other firms' products

Problems over Switching Cost

(1) Having corralled customers once, a firm can maintain them for a long term.

→ Influence on a long-term structure of competition

(2) To reduce switching cost artificially in order to steal a rival's customers

(E.g.) Price differentiation for preferential treatment of new customers

(3) To increase switching cost in order not to alienate corralled customers

(E.g.) A long-term contract + a hefty forfeit, and mileage service

Switching Cost and Competition

Symmetric duopoly: A customer consumes a single unit of service this period, and does the same next term.

Switching cost is zero. → Regardless of whether one bought service from Firm 1 or Firm 2 this period, one is free to choose a service provider for the second term.

～ Corresponding to the case of interchangeability

Switching cost is infinite. → If one bought service from Firm 1 this period, there is no choice but to do the same next term.

～Corresponding to the case of no interchangeability

Switching Cost and Competition

High switching cost

→ Having been corralled once, customers cannot run away even if the price goes up. → Competition becomes lax.

To reduce switching cost

→ Corralling of customers becomes difficult.

→ With a slight reduction of price, the rival's customers can be easily stolen. → Competition intensifies.

～A policy to cut back switching cost is a measure to promote competition. (Is it true?)

Switching Cost and Competition

High switching cost

→ Having been corralled once, customers cannot run away even if the price goes up. → Competition becomes lax.

~ High profits once a firm has corralled customers

⇒A strong incentive to corral customers

⇒Competition becomes fierce in the initial stage.

A policy to cut back switching cost is not a measure to intensify competition, but the one to change a method for competition.

Switching Cost and Competition Patterns

High switching cost

⇒ Competition becomes fierce in the initial stage.

(E.g.)

Campaign price (substantial discount on the initial cost)

Free distribution of machinery and tools

Discounted/free membership fee for the first year

Subsidy (incentive) for cellphone terminals

Switching Cost and Welfare Implications

(E.g.) Cellphone

Fierce competition in the initial stage ~ subsidy for terminals

Lax competition after obtaining customers ~ expensive call charge

Drop in switching cost (phone number portability, forwarding of the guidance mail on number changes, SIM lock release)

Drop in call charge ~ prices－marginal costs, drop in margins

Rise in terminals' prices ~ restraint on inefficient switching of terminals

⇒ Improvement of economic welfare

～ It's unclear whether or not these contribute to consumers' welfare.