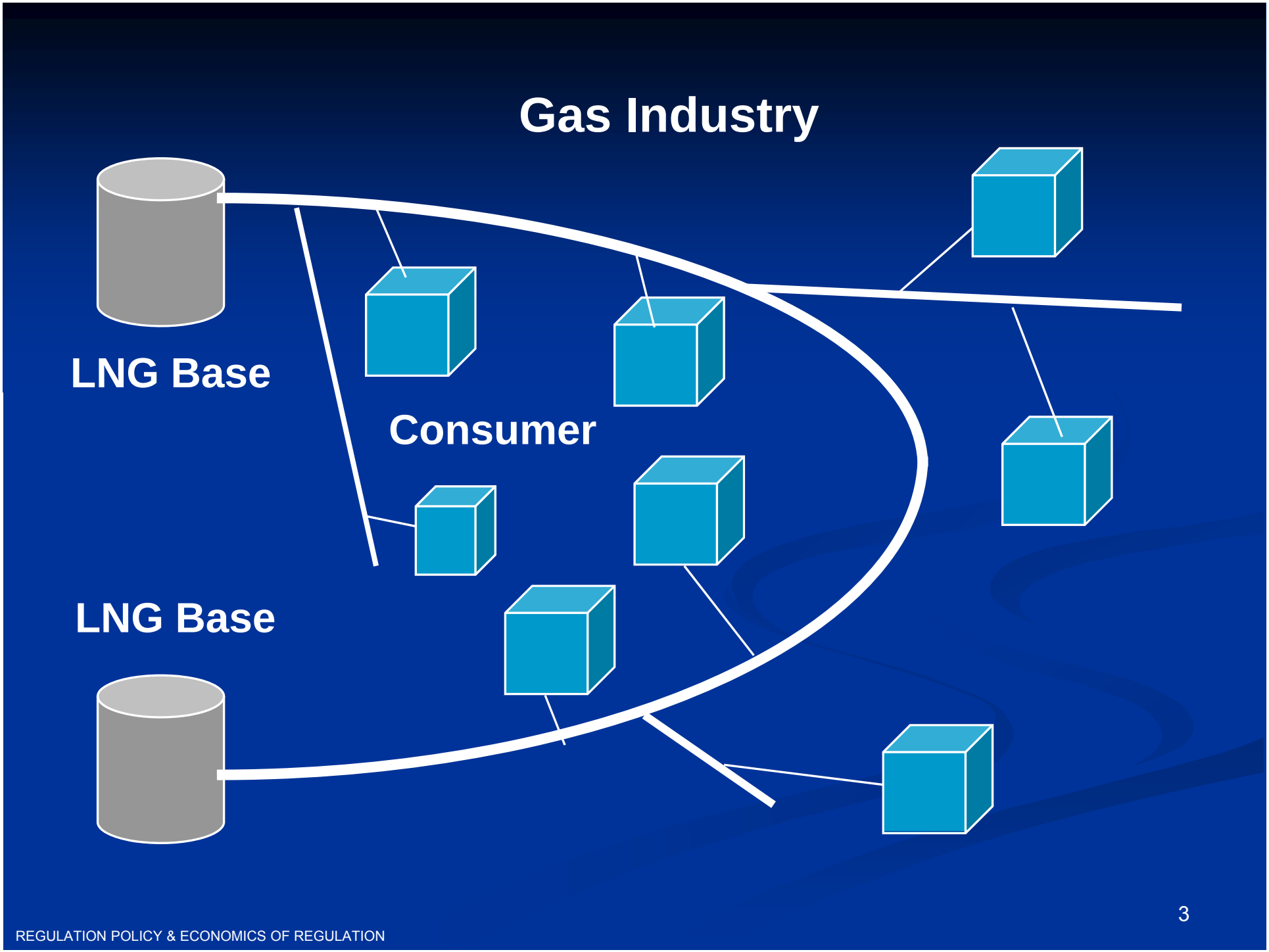
Regulation Policy and Economics of Regulation Class No. 10 (file 9): Regulatory Reform of City Gas Market

Objectives of Today's Class

(1) To understand characteristics of the city gas market
(2) To understand the course of events regarding the regulatory reform in the city gas market
(3) To understand a logical background behind the regulatory reform

Features Common to Markets of Electric Power and City Gas

- Public service industry
- Network type industry
- Energy market
- Regional monopoly
- Competition limited within the confines of the country
- Interregional competition being restricted


Gas Industry
LNG Base
Consumer
LNG Base

Features of Gas Market (Comparison with Electric Power Market)

- Coexistence of 3 markets (city gas, community gas, LP gas)
- Service areas of city gas being only 5.5% of the land
- Many enterprises → Big difference in the scale, conflict of interests
- Various managerial forms (a large number of public enterprises, diverse backgrounds)
- Lenient restrictions on simultaneous equal quantity
- Existence of a small number of strong competitors (like electric power business entities)
- Underdeveloped network
- Various transport forms

LP Gas

- Realm of perfectly free competition
- Acute competition → Customs to raise switching costs ~ Problem of installing plumbing free of charge (the level of transparency getting improved nowadays)
- Suspicion of the cartel over a period of many years (?)
- High costs of transport (price differential from city gas) ~ cooperative distribution by primary distributors
- Acute competition with city gas
- Cooperation with city gas business entities in the wake of competitive relationship with electric power
- Joint development of gas equipments with city gas entities
- Shrinkage in the market (the peak in 1996)

Community Gas

Small-scale facilities, centralized plumbing

E.g., the gas supply to a specified housing complex

A common pattern: enterprises have found their way into the business in territories where city gas business entities had not serviced.

Along with the expansion of areas serviced by city gas entities, there has been overlapping of areas among traders.

Status Quo of Gas Industry

	City Gas	Community Gas	LP Gas
Number of Business Entities	211 (incl. 36 public enterprises)	1,671	25,343
Number of Consumer Cases	27.76 mil	1.54 mil	26.00 mil
Gas Sales Volume (at conversion rate of 11,000kcal)	29.5 bln cubic meters (about 80% supplied by 4 major firms of Tokyo, Osaka, Toho, Seibu)	1.1 bln cubic meters	19.4 bln cubic meters

Course of Events Regarding Regulatory Reform in City Gas Market

(1) Monitoring of dubious competitive restriction among the business entities
(2) A partial liberalization of the sales market, an expansion of the scope of liberalization (2 mil cubic meters → 1 mil → 0.5 mil → 0.1 mil), and the adoption and expansion/ improvement of the consignment system
(3) Freeing of the regulatory schedule of charges
(4) Relaxation of the dual-business regulation
(5) Relaxation of the regulation regarding pipeline construction
(6) Separation of finances

Features of Regulatory Reform in City Gas Market

- High market share held by existing business entities as in the electric power industry

⇒Electric power business entities are potentially strong competitors in the gas market as well: there is a chance for a new entrant to expand its market share at once. (In fact, Kansai Electric Power Co. has achieved a major position as a sales entity of gas.)

- Isolated pipeline network

⇒Little possibility for a nationwide competition

- Difference in scale/productivity among entities ~ Informal price difference

⇒Possibility for the competition between major entities and medium-and-small businesses

Liberalized Market

Liberalization rate

29% (2 mil cubic meters in 1995) → 33% (1 mil in 1999) → 50% (0.5 mil in 2004) → 59% (0.1 mil in 2007)

Market share of new entrants: approx. 8% (Tokyo's 0.3%, Toho's 5.2%, Osaka's 11.8%)

Cf. approx. 2% in the electric power market

Another entry into the wholesale service

Why so big (as compared with the electric power market)?

(1) a growing market (2) supply/sales capacities (3) the supply restriction on existing business entities

Expansion of Demand for City/Natural Gas

A growth of 67%—0.2 as for electric power—for business purposes (the demand other than household use) during the past 10 years ~ A reversal possible hereafter

(1) Conversion from other fuels (heavy oil, LPG, coal, etc.)

· Superiority in the environmental aspect

· Superiority in the price aspect (especially the phenomena in recent years)

· Effective utilization of lands ← Switching costs to be incurred

(2) Adoption of the cogeneration system ← Entries of electric power business entities

(3) Conversion to natural gas

(4) Improvement of the conduit network

Status Quo of City Gas Market

(1) Decline in the large-lot price (as an average of the two leading firms)

For a quantity less than 2 mil cubic meters, the price was up 11.5% from 1999 (for one of 2 mil or more, up 11.3%), which is a drop of 7.5% (9.4% for one of 2 mil or more) after subtracting an effect of the raw material cost adjustment system.

(2) Decline in the small-lot—regulated household-use—price (as an average of the three leading firms)

Up 0.7% as compared to one in 1999, which is a drop of 6.8% after subtracting an effect of the raw material cost adjustment system. (29.7% drop by in comparison to one in 1980)

Cost Structure Of City Gas Market

Large lot (other than household use) ~ Ratio of raw material cost at 55% (32% 10 years before) Cf. fuel expense of electric power at 23% (16% 10 years before)

Small lot (household use) ~ Ratio of raw material cost at 17% (11% 10 years before) Cf. fuel expenses of electric power at 15% (11% 10 years before)

Principal cause of the price difference between domestic and overseas markets: Japan procures in LNG while Western countries do it via a pipeline. ← Absolutely not convincing. Even if Japan's raw material cost had been 10 times as high as that of Western countries' 10 years before, as for the price for household use, this hypothesis could have justified the domestic price being twice as much as that of the overseas market at a maximum.

To lower household-use cost (price), the reduction of the user cost, like one of metering, is indispensable (which also applies to electric power).

Informal Price Difference

- Diversified business entities: 175 privately operated, 37 publicly operated
- Diversified energy sources: domestic natural gas (6%), LNG (87%), nonnatural gas (propane and such) → Progress in calorific changes ~ To raise the standard calorie along with the changeover to natural gas ⇒ A big change in the cost structure
- Diversified transport forms: pipelines, coastal vessels, lorries, freight cars
- Large price difference between domestic and overseas markets: a gap as much as 4 times at an average unit price

Import Price of LNG Gas

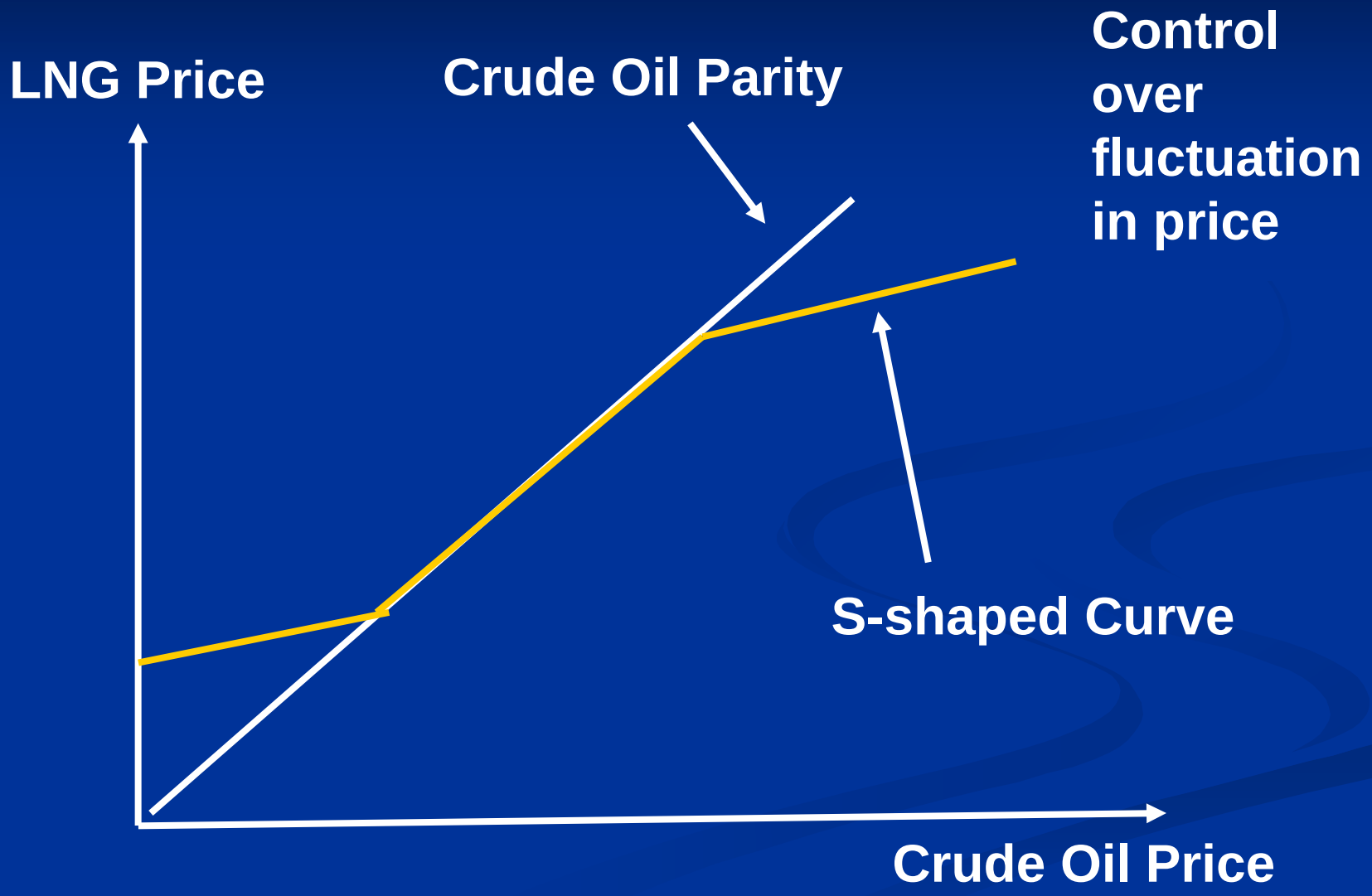
Features of LNG import contract

- A long-term contract being a mainstream
- Take or pay ~ Requirement to pay a minimum contract fee even when a buyer does not take the good

After the adjustment of calorie, the price basically gets set being linked to the price of crude oil.

Its modified versions ~ S-shaped curve

S-shaped Curve



Safety Regulations

- Large scope of responsibility on city gas business entities
  Safety responsibility and obligation regarding inner pipes and consumption equipments
    Cf. all the way up to meters in Western nations
- Low accident rates
  Japan: an accident rate of 0.23 per 1 mil cases (average for 2001-2003)
    Cf. UK: 1.33 (average for 2001-2002)
      Italy: 2.02 (average for 2000-2002)

And which may constitute another barrier to a new entry.

R & D Led by Gas Business Entities

- Custom-made articles like a boiler
  → Opening up of requests for development
- New development of equipments (TIS, GHP, clothes drier, heater-and-drier for a bath room, floor heating, glass-top range, *Ecojozu*, mist sauna)
- Cogeneration (*Ecowill*, *Lifuel*)
- LNG base
- Transport means
- Gas meter, meter inspection technology (remote meter reading) ~ More advanced technology than electric power

Competition in Household-use Market

- Competition among energies

All electrification vs. cogeneration

All electrification → As for building a new house, no plumbing for gas from the beginning → A huge switching cost

Cogeneration ~ Able to corral customers during an amortization period for equipments ~ Also a huge switching cost

Even in the field where gas has an advantage, electric power business entities can enter into thermal demand only by means of all electrification. ~ Distorted competition

Cf. competition among general energy firms in Western nations, competition in the liberalized fields in Japan

Competition among General Energy Industries

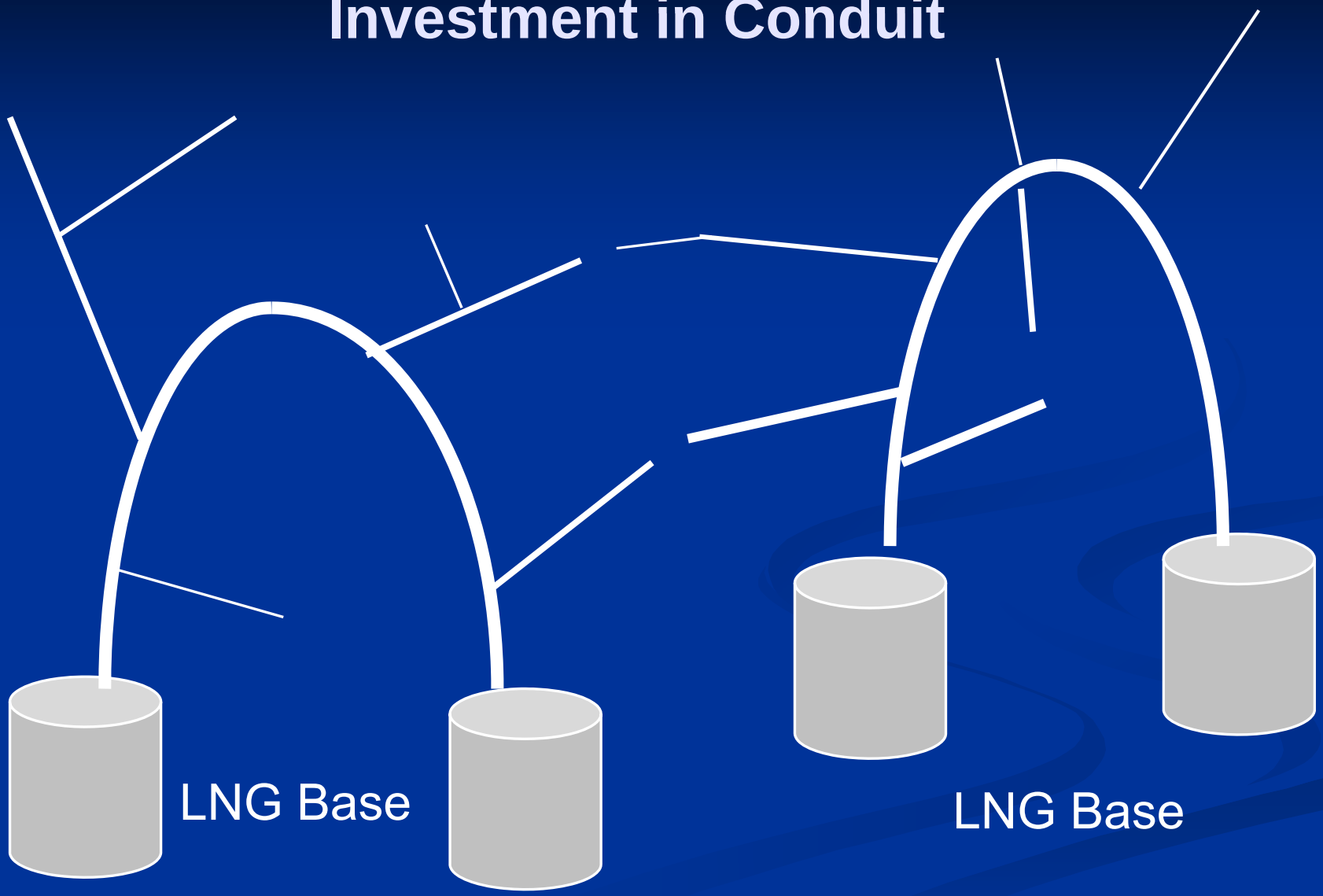
Private electric power generation for household use: a synthesis supply of electricity and heat

Agriculture utilization: electric power ＋ heat ＋ carbon dioxide

Waste utilization: cogeneration by biogas

Potentiality as a general energy industry may be bigger than an electric power business entity.　Cf. DSM (Class No.8)

Investment in Conduit



Incentive for investment in Conduit

- An incentive for investment in conduit may become small under the access regulation. ← Same structure as an optical fiber

Measures to maintain the incentive

(a) Tax benefits

(b) Device on a fair remuneration rate ← Consideration for risks

(c) Exemption for open accesses for a certain period of time

Voluntary Incentive for Investment in Conduit to Mutually Link Territorial Conduit Network

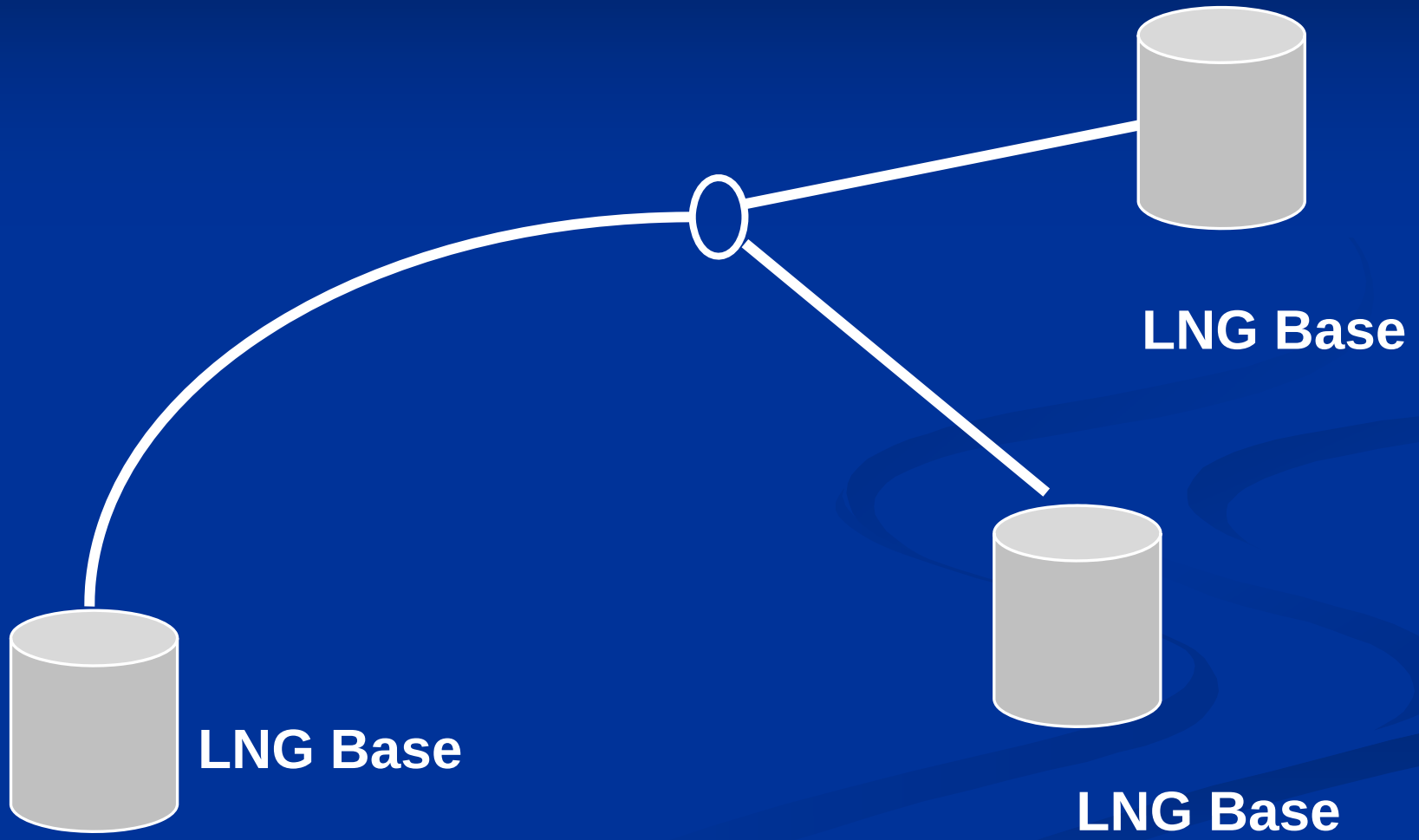
- Technological merits

  (a) Mutual interchange of gas, (b) pressure modulation

- Aspect to promote competition ← Incentive for not investing

  → Which brings forth societal benefit even if unused as a result.

Pressure Modulation

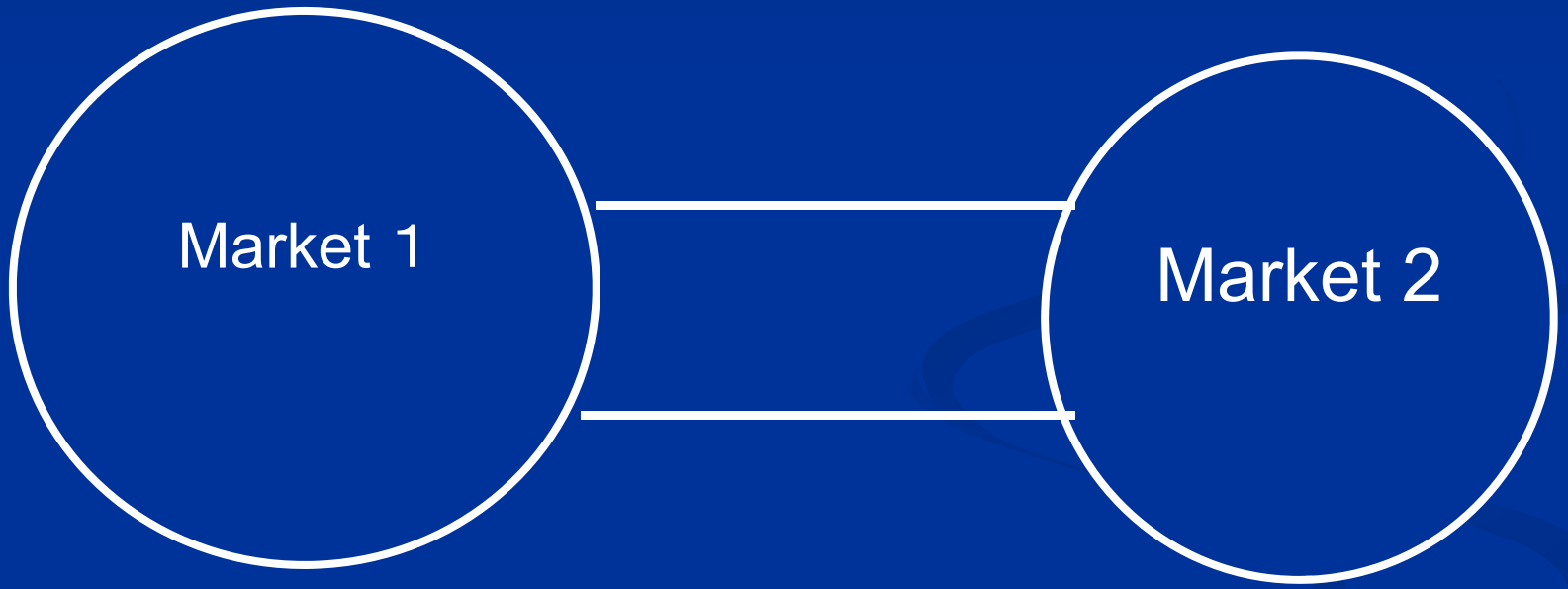


Incentive for Investment in Interconnecting Cables to Mutually Link Regional Power Grid

- Technological merits:
  - (a) Improvement of stability ⇔ Being a demerit concurrently
  - (b) Saving of the cost to maintain reserve electricity
- Aspect to promote competition

→ Which brings forth societal benefit even if unused as a result.

Mutual Linkage of Markets

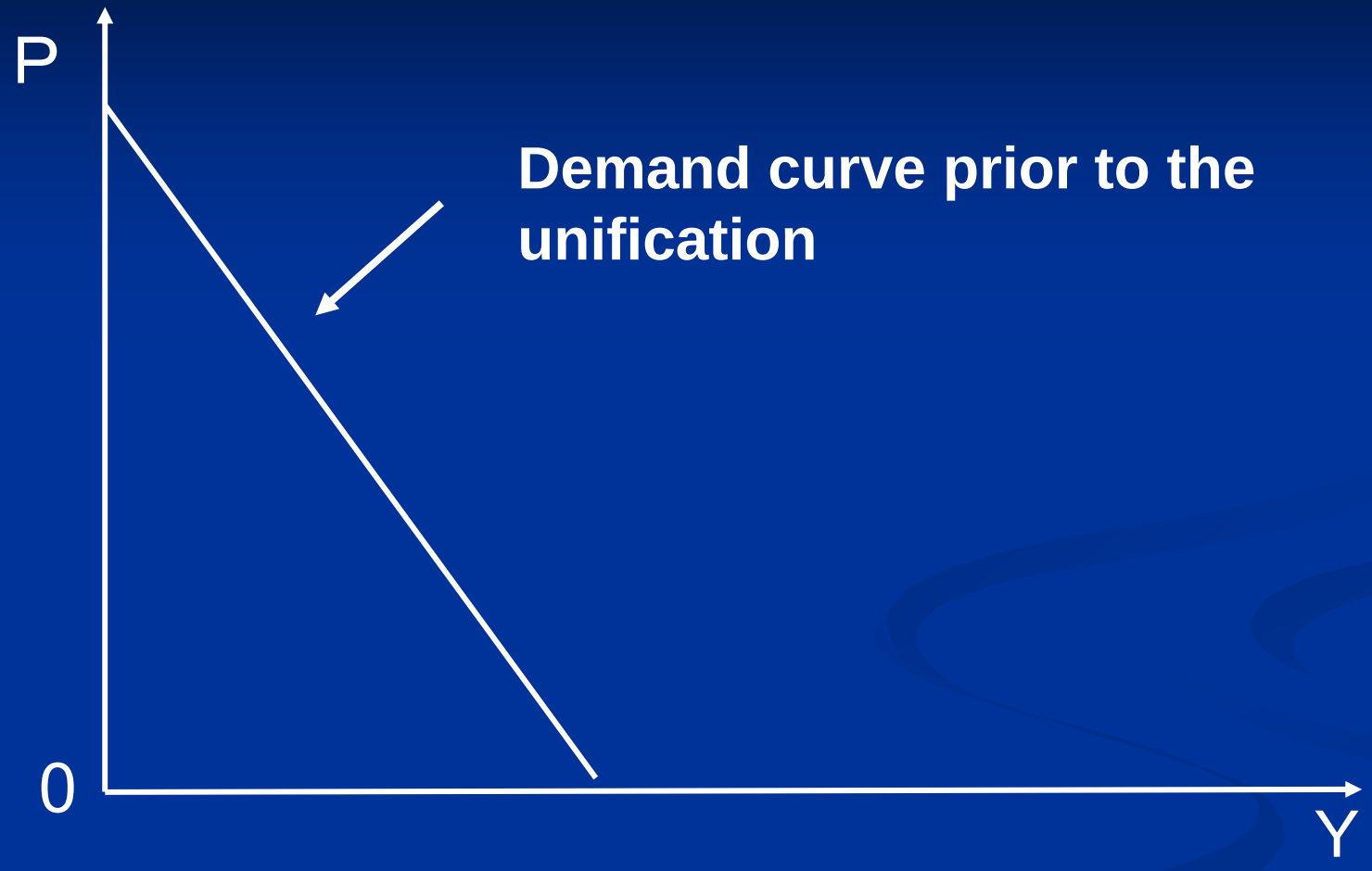


Effect of Mutual Linkage (Market Consolidation)

- Short term (fixed number of firms) ~ To think of Cournot competition

Question: Suppose the two regions have exactly the identical demand structure, cost structure, and number of firms. Will the competition become fiercer by the unification? If the number of firms becomes twice as many in the market, will competition become fiercer? Will the price come down?

Demand



Demand curve prior to the unification

Question: What is a demand curve after the unification?

Effect of Markets' Mutual Linkage (Market Consolidation)

- Short term (fixed number of firms) ~ To think of Cournot competition

  Question: Suppose the two regions have exactly the identical demand structure, cost structure, and number of firms. Will the unification make competition fiercer?

Short-term Effect of Mutual Linkage

- Short term (fixed number of firms) ~ To think of Cournot competition

  Question: Suppose the two regions have exactly the identical demand structure. If the firm in the market #1 is more efficient than the one in the market #2 (i.e., with a lower marginal cost), then, which firm would increase the share by the unification?

Long-term Effect of Mutual Linkage

- Long-term (free entry and exit) ~ To think of Cournot competition

Question: Suppose the two regions have exactly the identical demand structure, cost structure, and number of firms. Will the unification decrease or increase a number of equilibrium firms?

Effect of Mutual Linkage: Recapitulation

- Short-term merits
  (a) To close the gap between a competition-affected price and marginal cost
  (b) To cut down the share of a low-productivity business entity (production substitution)
- Long-term merit
  Decrease in the number of newly-joining firms → To correct excessive entries

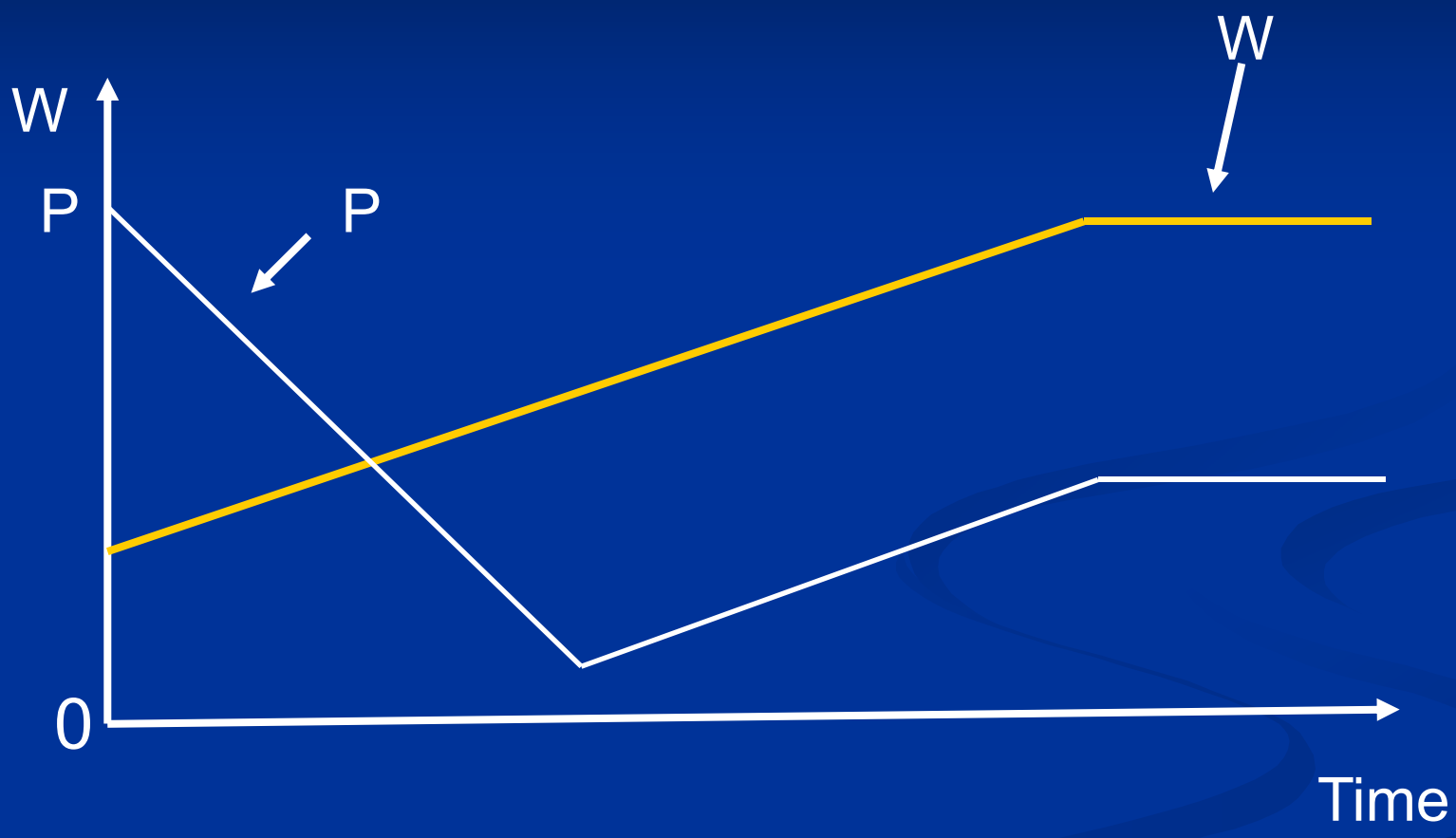
Investment in connecting conduits ⇒ To bring forth competition

→To reduce profits of existing business entities ~ Incentive for the investment becoming insufficient

⇒Left up to business entities, it is highly unlikely for the nationwide conduit to be formed.

Which is a problem of the identical structure that resides in the interconnecting cables in the electric power market .

Changes in Price and Welfare



System to Adjust Raw Material and Fuel Costs

- System to automatically pass on import prices of raw materials (natural gas, LP gas) ~ The fuel cost adjustment system in case of electronic power

Faced with steep rises in crude-oil prices, free-market traders are having a hard time.

← Amid our sufferings from high costs, it's impertinent that only public service entities can pass these on automatically!!

← The shifting ought to be curbed no matter how little by trying to improve business efficiency !!

Nonetheless, an automatic passing-on system in itself is a rational institution.

⇒There is a trend for this system to spread in non-regulated markets.

Perfect Competition and Cost Shifting

Question: Consider a perfectly competitive market. Assume that the number of firms is exogenously given (short term), and that the marginal cost is constant. Suppose the cost increases 10%. How much is the price to go up?

Question: Consider a perfectly competitive market. Let's think of a long-term equilibrium of the industry. Assume that there is an infinite number of homogeneous firms that are potentially capable to enter the market. Suppose the cost increases 10%. How much is the price to go up?

Perfect Competition and Cost Shifting

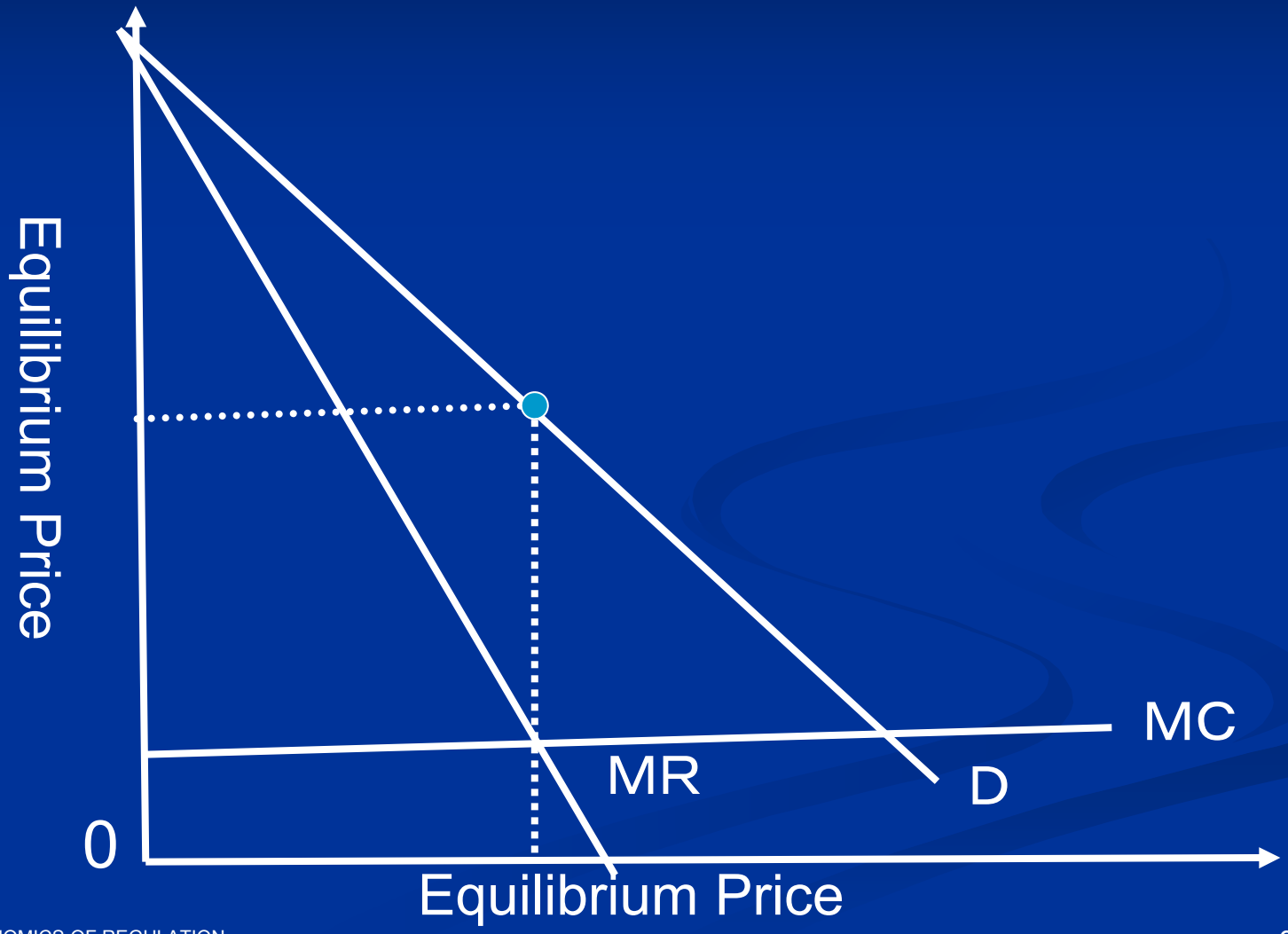
Question: Let's think of a long-term equilibrium of the industry. Assume that there is an infinite number of homogeneous firms that are potentially capable to enter the market. Suppose the cost—including the variable cost and the entry cost—increases 10% over the long term. How much is the price to go up?

Monopoly and Cost Shifting

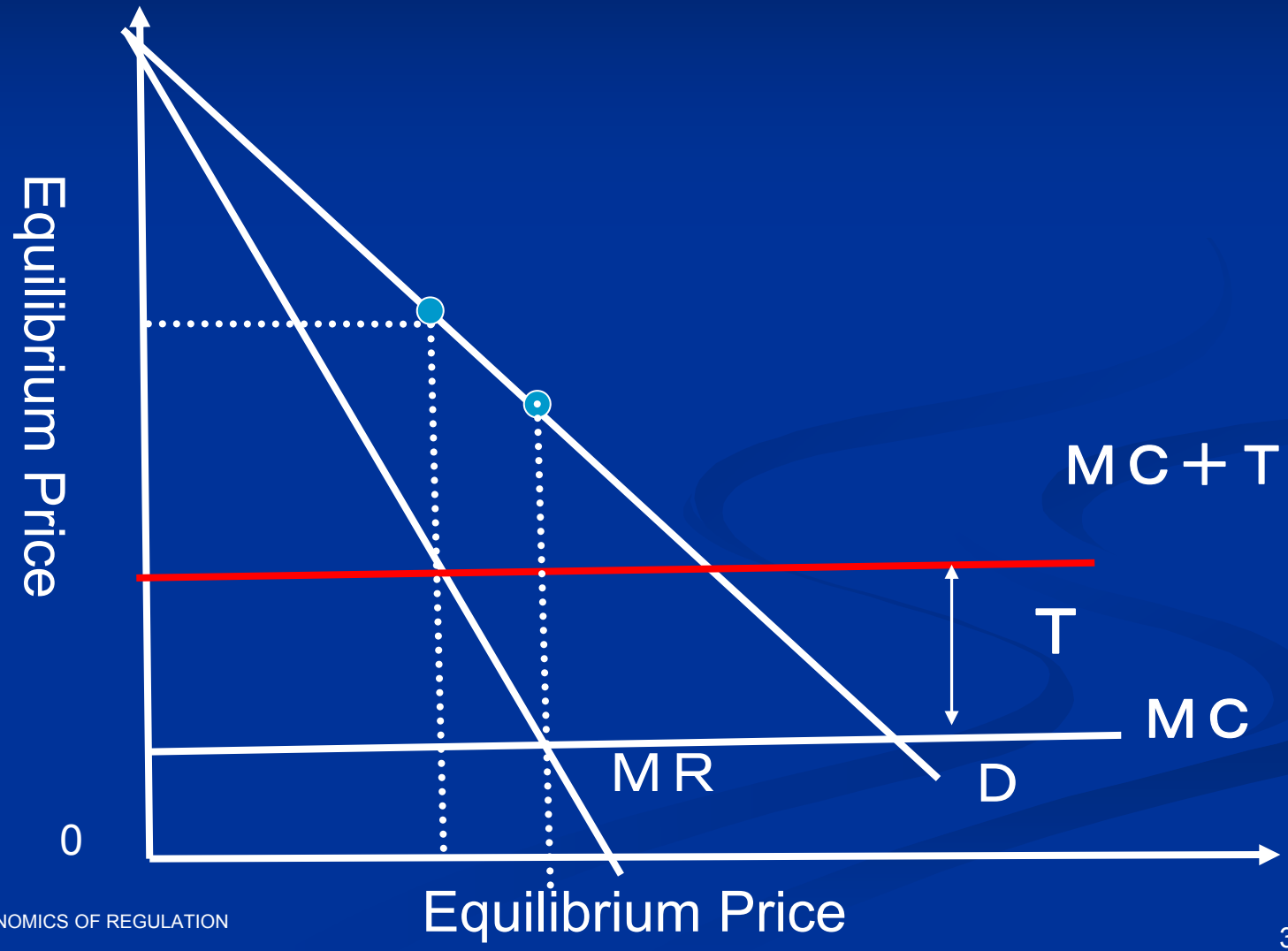
Question: Consider a monopoly firm. Assume that the demand function is linear, and that the marginal cost is constant. Suppose the cost increases by 1. How much is the price to go up?

Alternatives: larger than 1, or smaller than 1, or 1

Monopoly Market



Monopoly Market (after Cost Increase)



Issues of City Gas Market Reform

(1) Is it a competition in an open access to conduits, or one on the facility basis through a free investment in the conduit? ~ Problem identical to one with FTTH
(2) Privatization of publicly operated gas firms (like Sendai, for example)
(3) Competition among energies
  (a) Improvement of fair competition environments in the regulated sector
  (b) Cooperation among energy-business entities, and cooperate integration
  (c) Competition by methods of inefficient means that are not linked to lowering of the price
(4) LNG's procurement cost, advance to the upstream
(5) Gaps among business entities
(6) Development of the pipeline network