規制政策・規制の経済学
第7講　公企業と民営化政策

今日の講義の目的

（1）公企業と私企業の違いを理解する

（2）公企業改革の背後にある経済理論を理解する

Outline of the 7th Lecture

7-1 Public Enterprises
7-2 Roles of Public Enterprises
7-3 Mixed Markets and Privatization
7-4 Partial Privatization
7-5 Sequential Privatization and Welfare Implication

公企業

(a)　公的部門が保有する特殊会社･現業部門
(b)　公的部門が保有する企業
　　(a)+公的部門が株を所有する株式会社
(c)　公益事業を営む会社
この講義での定義は原則(b)

注　Public Firm はこの意味での公企業を指すケースと、公開企業を指すケースがあるので注意が必要

所有だけではとらえきれない企業の特徴

(a)　郵便局と郵政公社の違い

(b)　帝国鉄道、国鉄と初期のJRの違い

1869-98 規制当局と現業部門（官鉄）の非分離

1898-08 民営鉄道の発展と規制当局と官鉄の分離

1908-49 鉄道国有化、規制当局と現業部門（帝国鉄道）の一体化

1949-87 鉄道公社化、規制当局と現業部門（国鉄）の分離

1987-　国鉄分割民営化、JR発足

典型的な公企業が存在する状況

- 幼稚産業育成、パイロットプラント
- 基幹産業(鉄鋼・半導体・自動車)
- 軍事的に重要な産業(鉄鋼、造船、自動車、航空機、通信、鉄道、エネルギー)
- 研究開発部門
- 社会的規制の関連分野(教育、医療、タバコ)
- 公益事業、自然独占市場(電気、ガス、水道)
- 一時的な救済(銀行、自動車)
- 海外企業への対抗(エネルギー、医薬、貿易)

公企業の存在理由

- 軍事面での重要性
- 公益性
- 外部経済
- 収益（政府収入）の確保
- 自然独占性、不完全競争
- （採算性が低く）民間ができない事業

Classical discussions of public firms

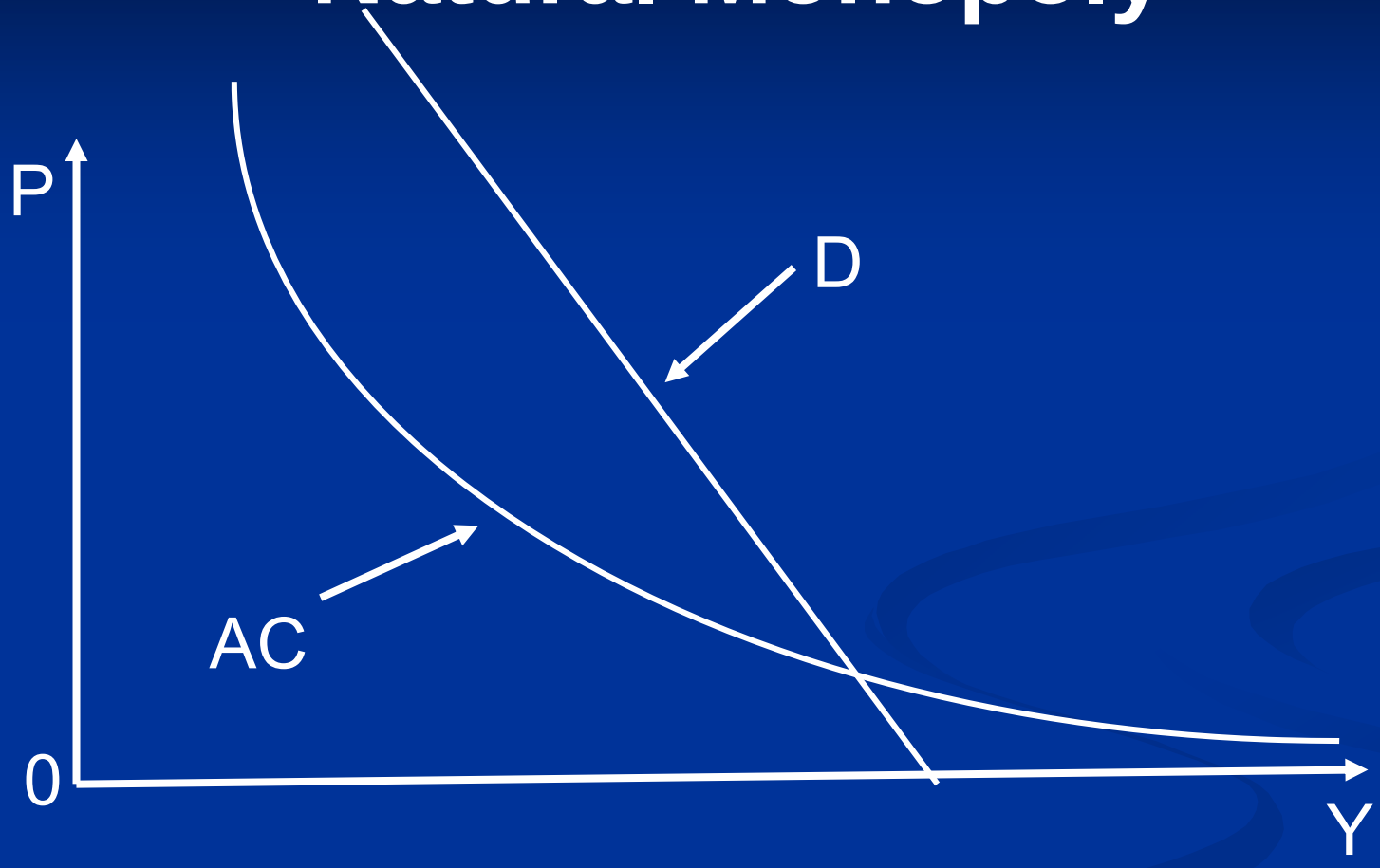
Why do public firms exist?

(1) Natural monopoly

(a) Public firm monopoly

(b) Regulated private firm monopoly

Natural Monopoly



Classical discussions of public firms(2)

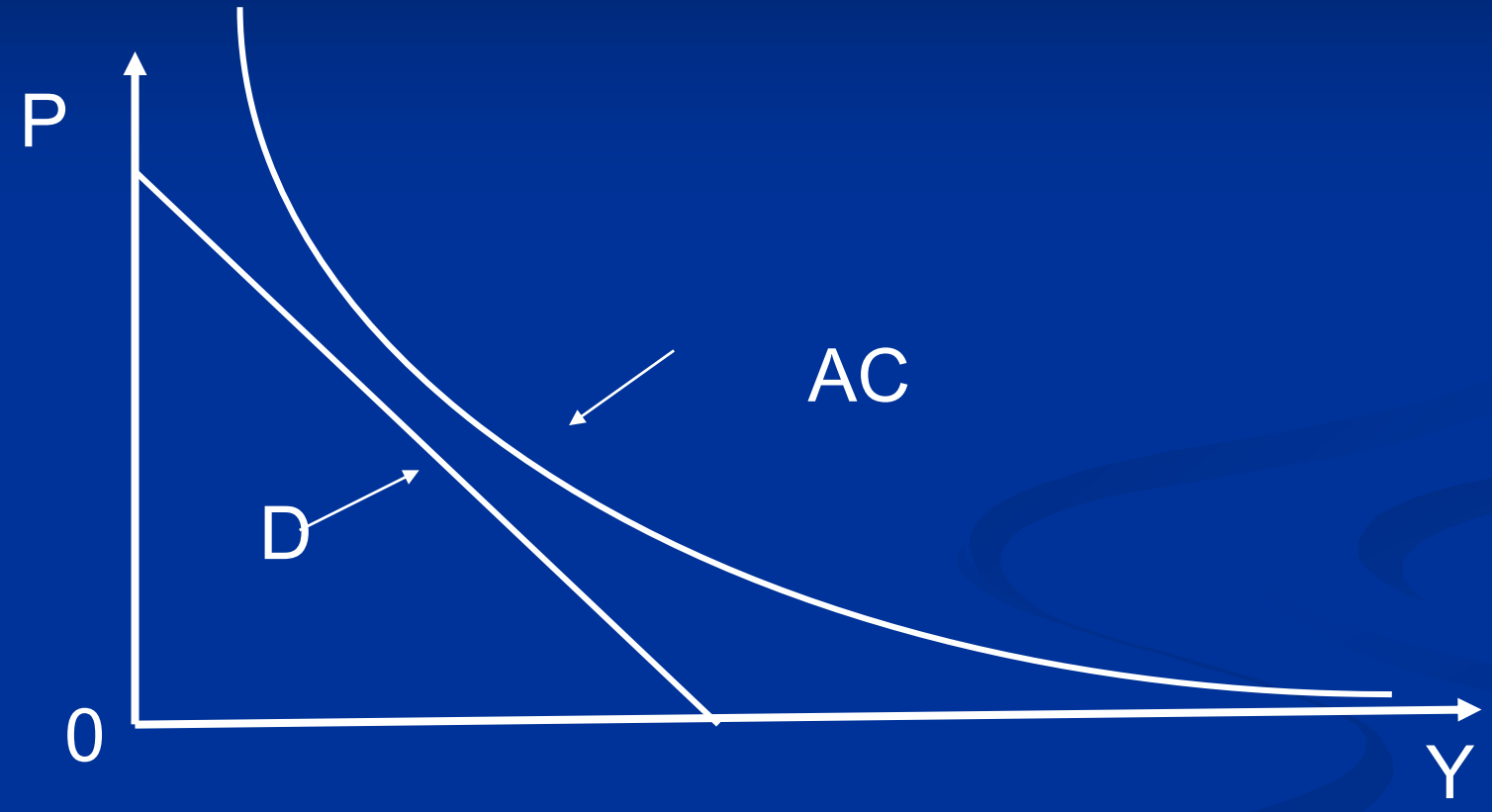
Why do public firms exist?

(2) Unprofitable market

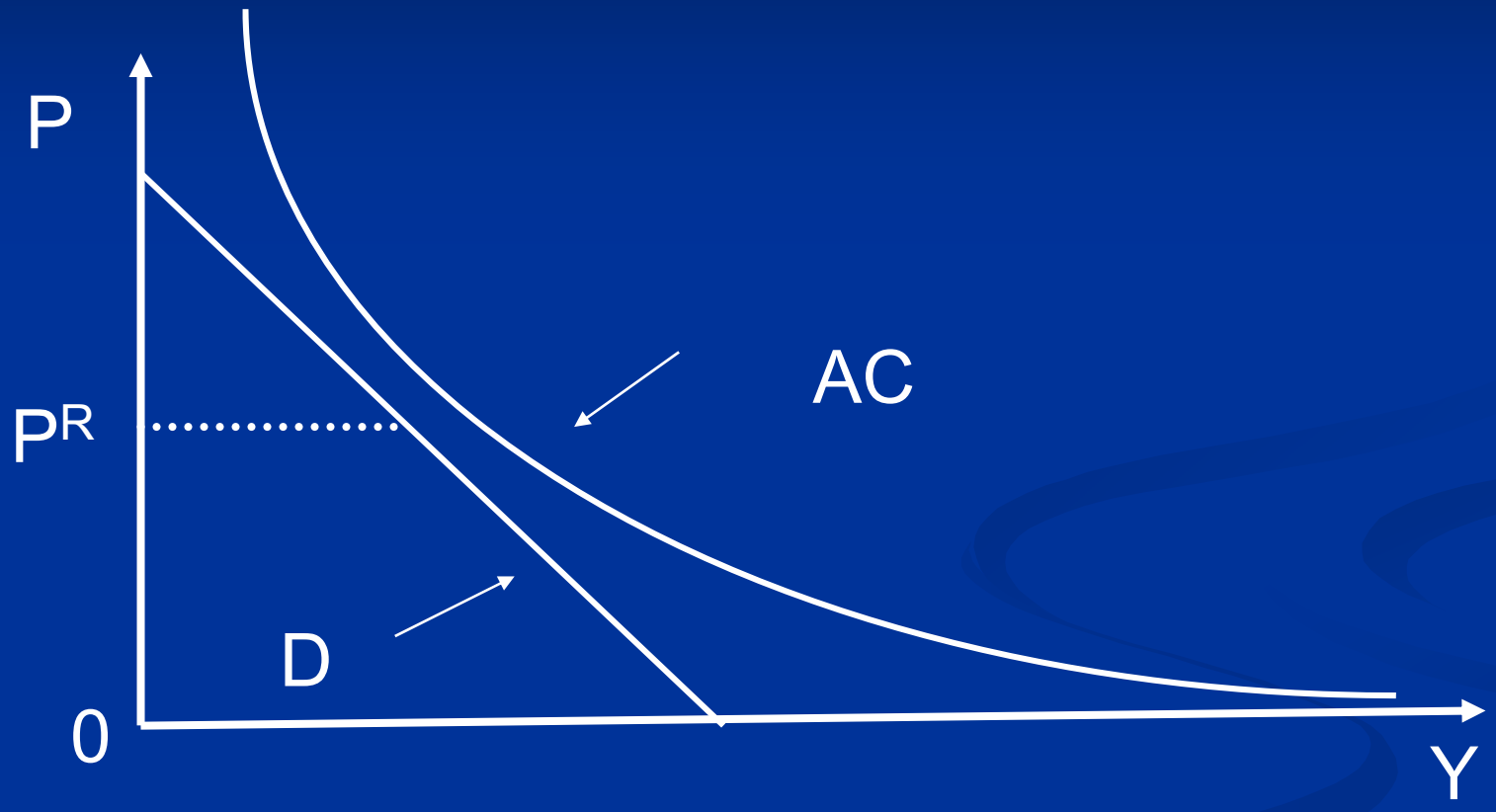
(a) Public firm monopoly

(b) Private firm monopoly with subsidy
(compensation of deficit from public funds)

Non-Profitable Market

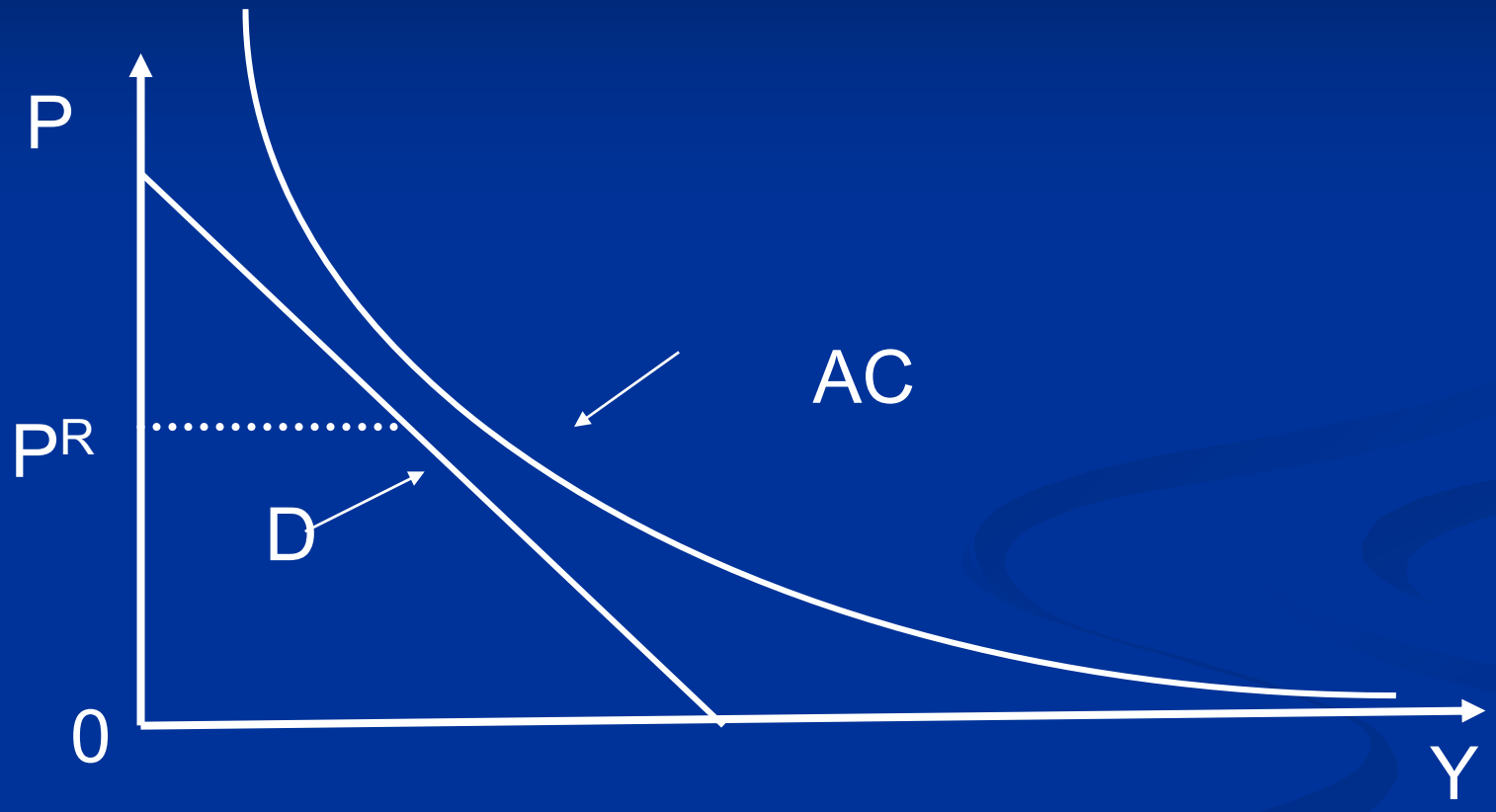


Non-Profitable Market



問題：P^Rの価格を付けたときの消費者余剰は

Non-Profitable Market



問題：P^Rの価格を付けたときの生産者余剰は

Classical discussions on state-owned public firms

→Public firm is the monopolist

In real economies, public firms are not always monopolists.

Public firms do not always face significant economy of scale, which guarantees monopoly by the public firm.

独占企業としての公企業

規制で対応する私企業の独占と同種の問題が発生
違いは？

- incentiveの構造が違う可能性
- 情報の構造が違う可能性
- 直接の管理ができる可能性

Mixed Oligopoly, Mixed Market

State-owned public firms compete against private firms

Examples of mixed oligopoly in Japan

Banking: Postal Bank, DBJ, Iwate Bank

Housing Loan: the Public House Loan Corporation

Private Funds: DBJ, Industrial Revitalization Corporation of Japan

Life Insurance: Postal Life Insurance (Kampo)

Overnight Delivery: Japan Post

Energy: Public Gas Corps (Narashino, Fukui,…)

Broadcasting: NHK

Examples of mixed oligopoly in other countries

Banking: Postal Banks (New Zealand, U.K., Germany,...)

Automobiles: Renault, VW

Medicine: Public Institute in Brazil

National Defense, Aviation: EADS, Airbus

Airline: National airlines (Swiss, Belgian, France,...)

Overnight Delivery: USSP

Energy: Electricite de France, Gas de France

Broadcasting: BBC

Differences between public and private firms

(1)Public firms are less efficient than private firms.

→Many empirical works do not support this view (and many other papers do support this view).

(2) Difference of objective function

→Private firms maximize their own profits, whereas public firms might care about social welfare.

Problem(1)

(1) How to provide incentives for welfare maximization?

→ This is the central issue for the public firm's monopoly

If we assume that the public firm is a welfare-maximizer under the monopoly, it is absolutely obvious that the first best is achieved by definition.

→no unsolved research problem. Thus, researchers never assume that the public firm is a welfare maximizer when they consider monopoly situation.

Problem(2)

(2) Is the welfare-maximizing behavior by the public firm efficient?

→This problem never appears in the public firm's monopoly.

This question makes sense in mixed oligopoly because welfare-maximizing behavior by the public firm might worsen welfare through strategic interaction between public and private firms.

→This is the central issue of mixed oligopoly

Issues of mixed oligopoly

・Is welfare-maximizing behavior by the public firm desirable in mixed oligopoly ?

・What distortion does welfare-maximizing behavior by the public firm yield ?

De Fraja and Delbono(1989)

(1) Cournot-type (quantity-setting competition, simultaneous-move, no product differentiation)
(2) No cost difference between public and private firms.
(3) Linear demand and quadratic cost function.
(4) The private firm maximizes its own profits given outputs of other firms.
(5) The public firm maximizes social welfare given outputs of other firms.

問題

(1) Cournot-type (quantity-setting competition, simultaneous-move, no product differentiation)
(2) No cost difference between public and private firms.
(3) Linear demand and quadratic cost function.
$c_i(q_i)=0.5\alpha q_i^2$
(a) 限界費用は？
(b) 限界費用は（逓減、一定、逓増）

問題

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(2) No cost difference between public and private firms.
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均衡において私企業の限界費用は均衡価格(より高い、より低い、と等しい)

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Results

Compare the pure economy (after the privatization) to the mixed economy (before the privatization)

→Privatization of the public firm might improve welfare

$W^P > W^M$ or $W^P < W^M$.

$W^P > W^M$ more likely takes place when the number of private firms are large.

Intuition

(1) Privatization of the public firm reduces public firm's output q_0

(2) Privatization increases each private firm's output q_1

→production substitution from the public firm to the private firms.

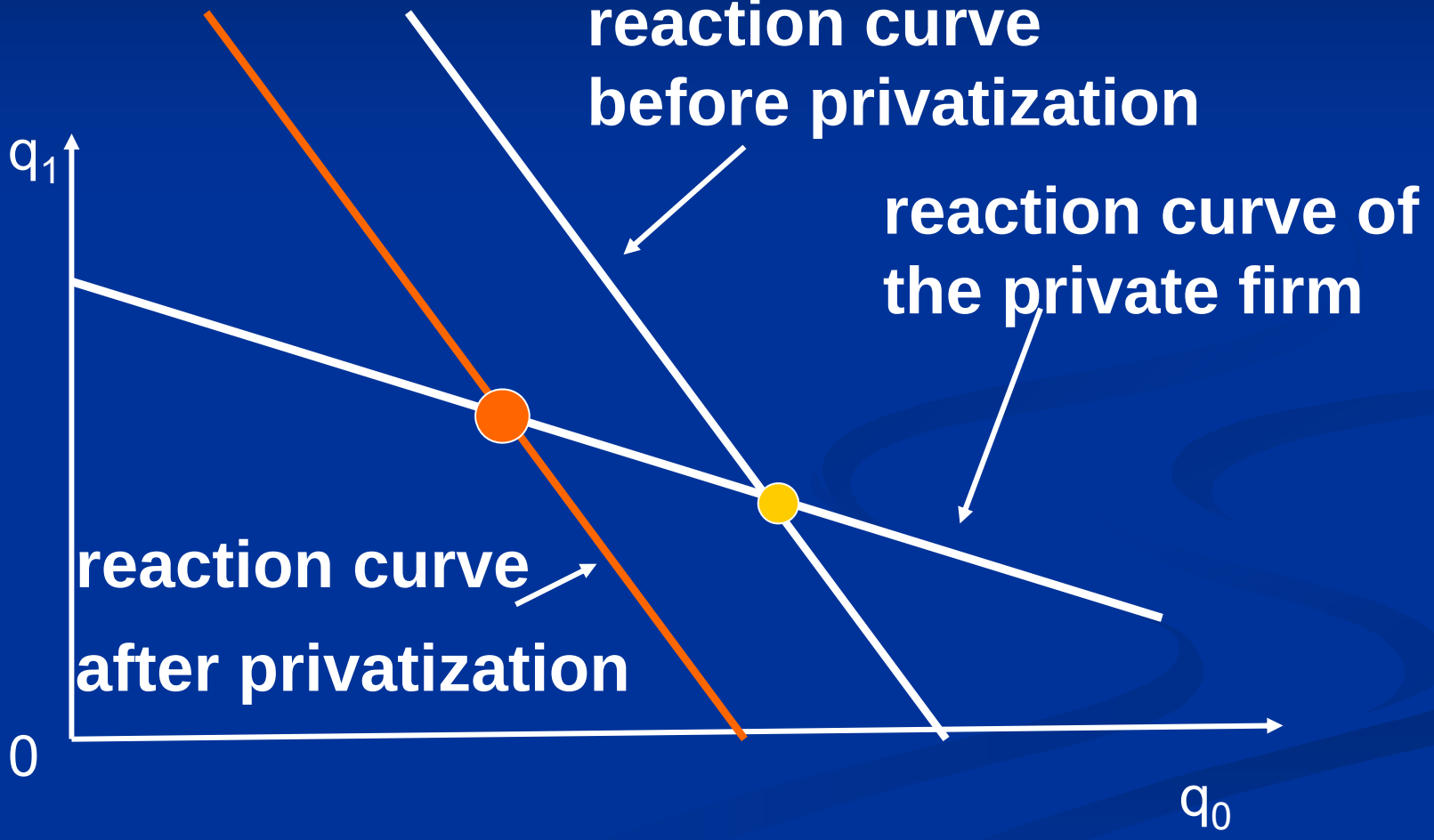
(3) Privatization decreases total output $q_0 + nq_1$

Effects (1) and (3) reduce welfare and effect (2) improves welfare. Effect (2) may be the strongest, leading to an improvement of welfare.

(2) is stronger and (3) is weaker when m is larger

→Privatization morel likely improves welfare when n is larger.

Production substitution



More detailed explanation of intuition

Privatization of the public firm reduces q_0 and increases q_1 (production substitution).
Before Privatization $p=c_0' > c_1'$
→Public firm's marginal cost is higher than private firm's
→ Production substitution from public to private economizes production costs →Welfare-improving
→Privatization reduces total production level and so consumer surplus → Welfare-reducing
It is possible that the former effect dominates the latter effect.

Contribution of De Fraja and Delbono(1989)

(1) No cost difference between public and private firms
→ privatization does not improve production efficiency
(2) Public firm's objection: welfare →No agency problem in the public firm
(3) No additional policies by regulation, tax, or subsidy after privatization.
⇒Ideal circumstances for the existence of public firm.
Against assumptions for the advocators of privatizations. → Nevertheless, privatization might improve welfare

Assumptions of De Fraja and Delbono(1989)

Many researchers in this field believe that the assumptions above are plausible, but many other researchers (as well as I) make these assumptions for strategic purposes.

(1) Even without cost differences, privatization improves welfare.

→If public firm is less efficient, much more.

(2) Even without any agency problem in the public firm, privatization improves welfare.

→If public firm has agency problems, much more.

Why quadratic costs？

Constant marginal cost yields problems

If marginal costs are constant and no cost differences exists, the public firm's monopoly yields the first best.

→ It is nonsense to discuss mixed oligopoly in such a circumstance.

How to avoid this problem?

(1) Using constant marginal costs and assuming cost differences between public and private firms. Mujumdar and Pal (1998),Pal (1998),Matsumura (2003a),Matsumura and Ogawa (2010)

First best is achieved by the marginal cost pricing of the private firm.

The private leadership yields the second best where only private firms produce and the price is equal to the marginal cost of the public firm.

It is the equilibrium in the observable delay game.

How to avoid this problem?

(2) Using increasing marginal costs. De Fraja and Delbono (1989),Fjell and Pal (1996), White (1996), Matsumura and Kanda (2005), Heywood and Ye (2009a), Wang et al (2009), The paper presented yesterday.

If there is no cost difference between public and private firms, at the first best all firms chooses the same output level. It is not always achieved in mixed oligopoly since public and private firms have different objectives.

How to avoid this problem?

(3) Dropping the assumption of homogenous goods.

Monopolistic competition: Anderson et al. (1997), Matsumura et al (2009)

Linear demand (quadratic utility function) with product differentiation: Fujiwara (2007)

Mill pricing location model: Cremer et al. (1992), Matsumura and Matsushima (2003,2004), Inoue et al (2008),

Delivered pricing location model: Matsushima and Matsumura (2003,2006), Heywood and Ye (2009b)

How to avoid this problem?

More general Costs : Matsumura (1998, 2003b), Kiyono and Tomaru (forthcoming)

Discuss both (2) and (3): Matsumura and Shimizu Shimizu (2010)

Partial Privatization

De Fraja and Delbono: The public sector holds whole shares in the firm (nationalization) or the private sector holds whole shares in the firm (privatization)

In the real world, we observe many firms with mixture ownership (partial privatization)

NTT, JT, Iwate Bank, Hokuriku Electric Power Company, VW, Renault

Matsumura (1998)

(1) Cournot-type (quantity-setting competition, simultaneous-move, no product differentiation)
(2) No restrictions on the cost differences between public and private firms.
(3) The objective function of the public firm is the weight sum of social welfare and its own profits.
（Partial Privatization）
$U_0 = (1-\alpha) W + \alpha\pi_0$
(4) General demand and general costs.
The government chooses s and s affects α. After observing α firms compete in the product market.

Results

α =0 is optimal only if it yields public monopoly.
→If we allow partial privatization, no privatization (full nationalization) never becomes optimal.

Intuition

(1) Suppose that α =0. A slight reduction of α reduces public firm's output q_0 .
Since $p=c_0'$, this effect is negligible (second order)
←envelope theorem
(2) Reducing α increases private firm's output q_1
Since $p>c_1'$, this effect is nonnegligible (first order)
⇒(2) dominates (1).

Partial Privatization

Free Entry: Matsumura and Kanda (2005), Wang et al (forthcoming)
Product Differentiation: Fujiwara (2007)
Spatial Model: Lu and Poddar (2007)
Environmental Policy: Kato (2006), Ohori (2006)
Anti-Trust: Barcena-Ruiz and Garzon (2003)
Labour Market: Beladi and Chao (2006)
Subsidization: Tomaru (2006)
Endogenous Timing: Matsumura and Ogawa (forthcoming), Barcena-Ruiz and Garzon (forthcoming)

Optimal degree of privatization

If we adopt partial privatization approach, we can investigate the optimal degree of privatization (optimal degree of α.

Optimal degree of privatization depends on

(i) the number of private firms

(ii) the degree of foreign penetration

(iii) cost difference between public and private firms

(iv) existence of other policy instruments such as tax-subsidy policy and shadow cost of public funding

(vi) Competition structure (free entry, role of public firm and so on)

Optimal degree of privatization

Suppose that firms faces Cournot competition. Optimal degree of privatization is increasing in the number of private firms. It is decreasing in the foreign penetration in product markets in the short run, and the result is inversed in the long-run. The latter result is robust because it does not depends on the strategic substitutability in product markets.

Foreign Competitors

Public firm maximizes domestic welfare
→The public firm's behavior is dependent on whether its rivals are domestic or foreign
If the rivals are foreign, the public firm becomes more aggressive.
Fjell and Pal (1996)←De Fraja and Delbono (1989)
Pal and White (1998) ← Strategic Trade Policy
Mukherjee and Suetrong (2009) ← FDI
Chang (2005), Chao and Yu (2006), Fujiwara (2006) ← partial privatization version

問題

(1) Cournot-type (quantity-setting competition, simultaneous-move, no product differentiation)
(2) No cost difference between public and private firms.
(3) Linear demand and quadratic cost function.
(4) The private firm maximizes its own profits given outputs of other firms.
(5) The public firm maximizes domestic social welfare given outputs of other firms.
(6) Private firms are foreign firms.

問題：均衡において私企業の限界費用は均衡価格（より高い、より低い、と等しい）

問題

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Assumptions of single public firm

Most existing works consider models with single public firm.
If this single public firm is privatized, the market becomes pure market economy.

Assumptions of single public firm

Considering desirable reform of the economic system in former communist transitional countries, this is not a plausible assumption. In reality numerous public firms exist in such countries and it is politically impossible to privatize all of the public firms at the same time.
Considering large scale privatization program in traditional mixed economies, one privatization does not yield pure market economy (because substantial public firms remain after the privatization of several firms).
→Existing works cannot analyze these markets effectively.

Examples of economies with multiple public firms

(1) Former communist transitional countries

(examples) Russia, Many of Eastern and Central European countries, China, Vietnam, Mongolia...

(2) Developing, recently developed, and emerging countries

(examples) Brazil, India, Iran, Indonesia, Thailand, Korea, Taiwan...

Examples of economies with multiple public firms

(3) Successful privatization programs in developed countries

(examples) UK, Japan, Germany, Australia, NZ

(4) Traditional mixed economies in developed countries

(examples) Japan, France, Germany, Korea

Why did existing works consider models with single public firm?

If no cost differences between public and private firms exists, obviously N=m yields the first best outcome.

→Full nationalization of the economy (complete communist economy) yields the first best.

→ It is nonsense to discuss mixed oligopoly under such assumptions.

But the result （complete communist economy yields the first best） is so unrealistic and implausible.

The assumption of no cost difference between public and private firms

If m=N (pure planned economy), no competitive pressure exists and the assumption of no cost difference is not plausible.

→Restricting attentions to single public firm and avoiding the nonsense result that the first best is achieved by pure nationalized economy.

Approach of Matsumura and Shimizu (2010)

Suppose that the economy has 100 firms and 25 of them are public firms.

Then the number of public firms becomes 24,23,22,... by privatization.

What happens in the process of this privatization?

We believe that it is worth discussing this problem.

We dare to deviate from the traditional single public firm model.

Matsumura and Shimizu (2010)

m state-owned public firms compete against N-m private firms. N firms face Cournot competition.

Each public firm maximizes welfare, while each private firm maximizes its own profits.

Quadratic costs:

$c=0.5\alpha(q_i)^2+K$ (public firm),

$c=0.5\beta(q_i)^2+K$ (private firm), $\alpha \geqq \beta$

Linear demand

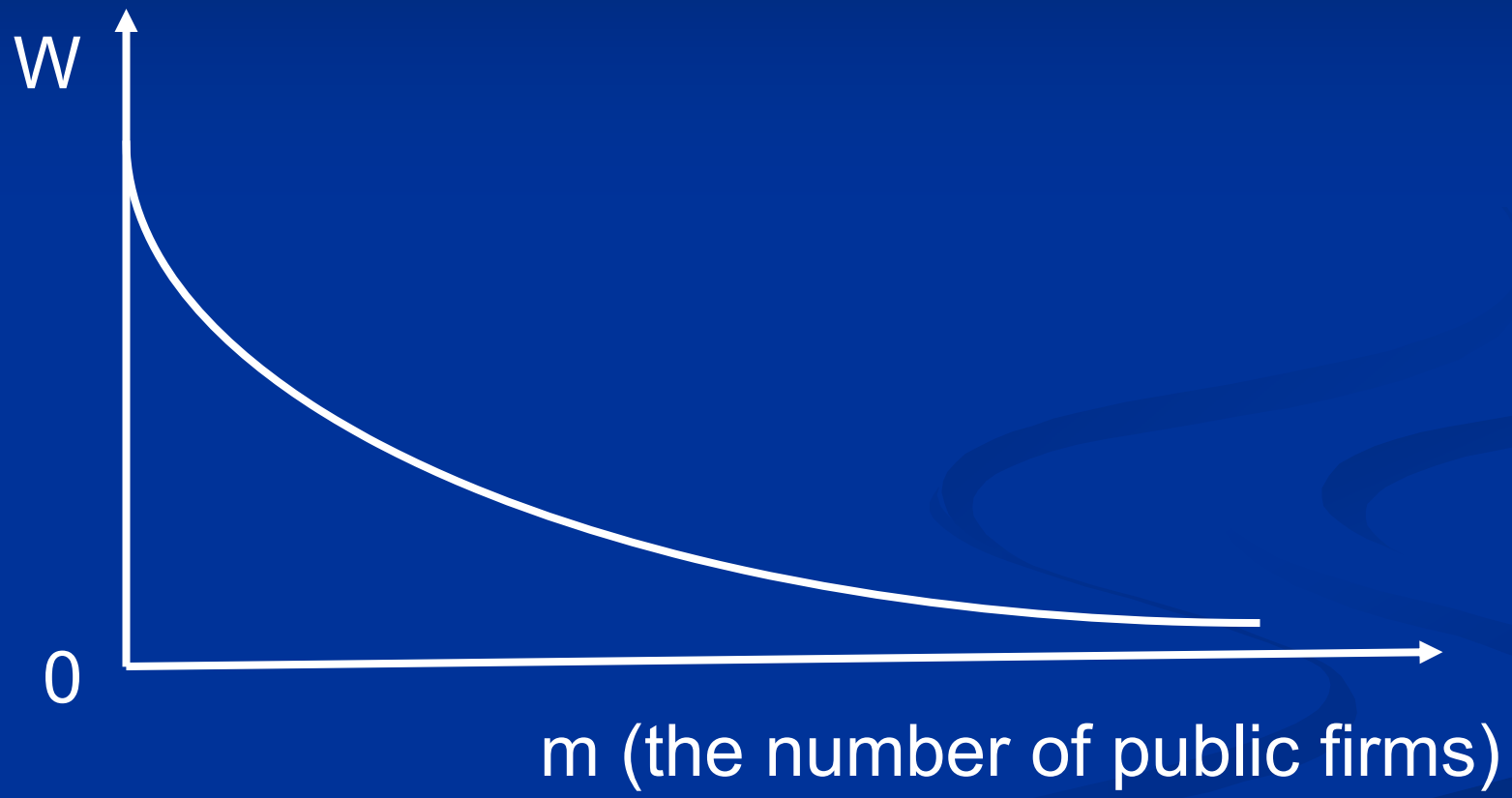
$P=a-Q$

Result 1

(1) W(m) is decreasing if the public firms are significantly less efficient than the private firms. (W is total social surplus, consumer surplus + profits of firms. m is the number of public firms)

If public firms are sufficiently less efficient than the private firms, privatization improves welfare regardless of m and N

Result 1

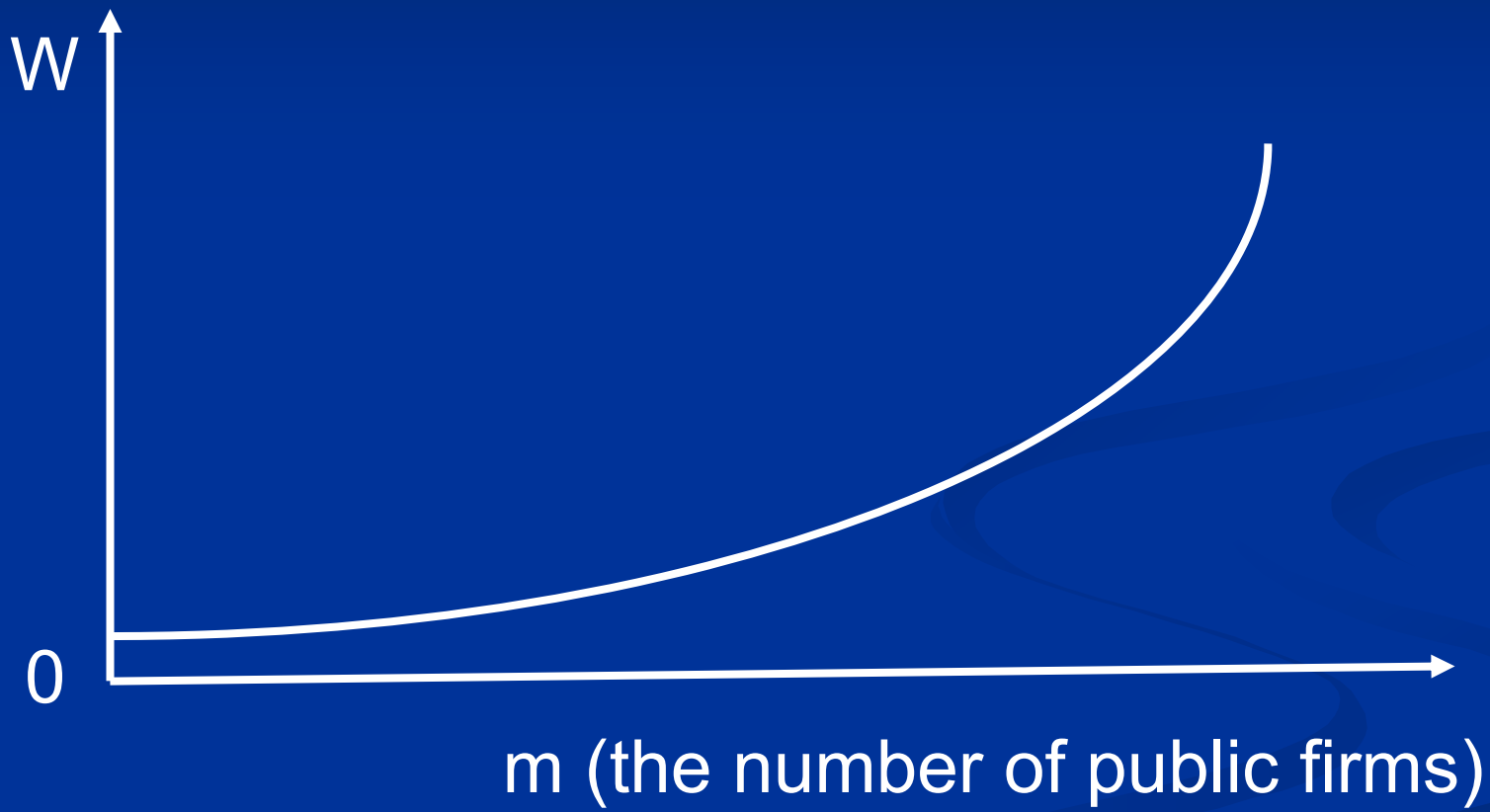


Result 2

(2) W(m) is increasing if the cost difference between public firms and private firms are sufficiently small and the total number of firms N is small.

The government should improve the competitiveness of the market before privatizing the public firms.

Result 2

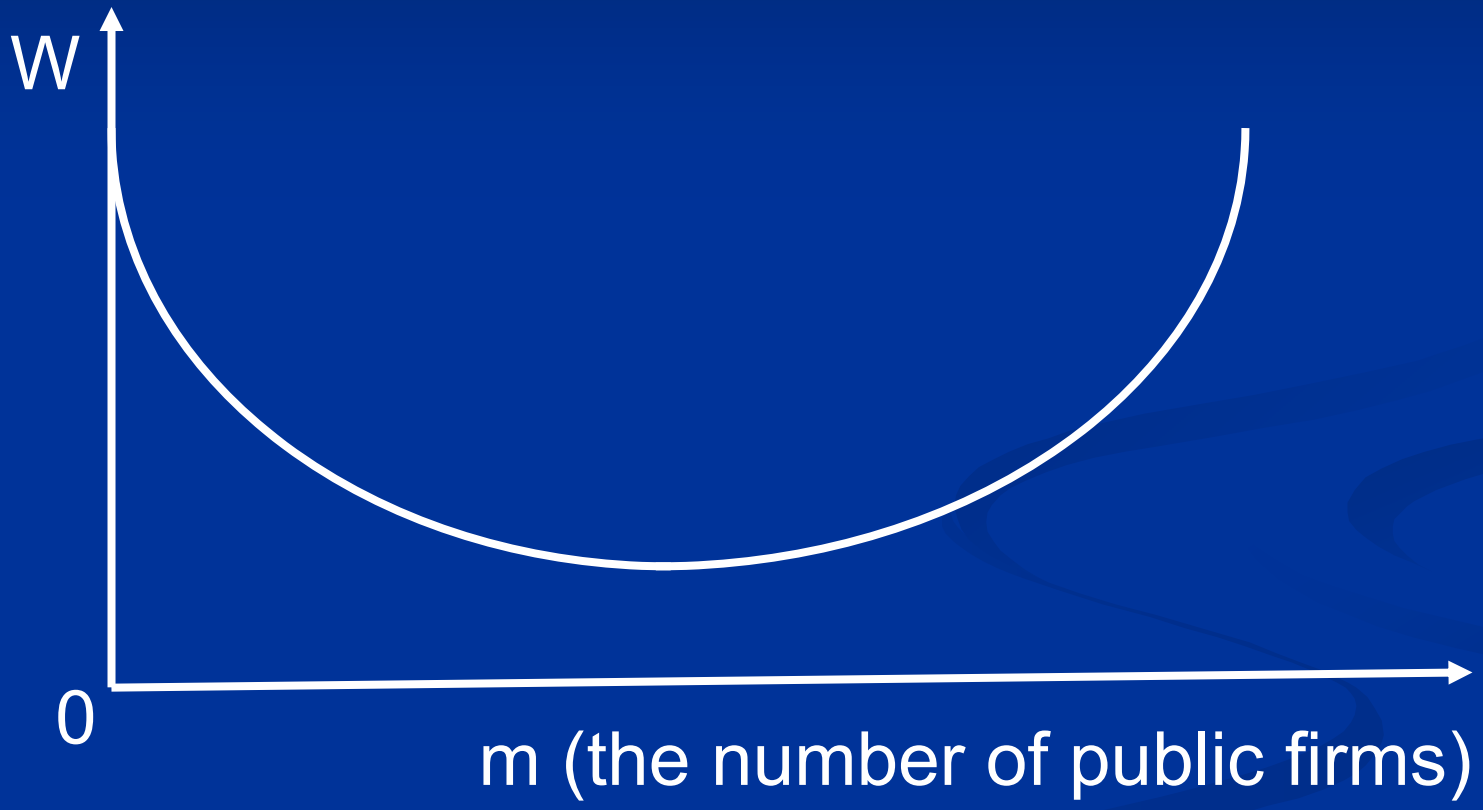


Result 3

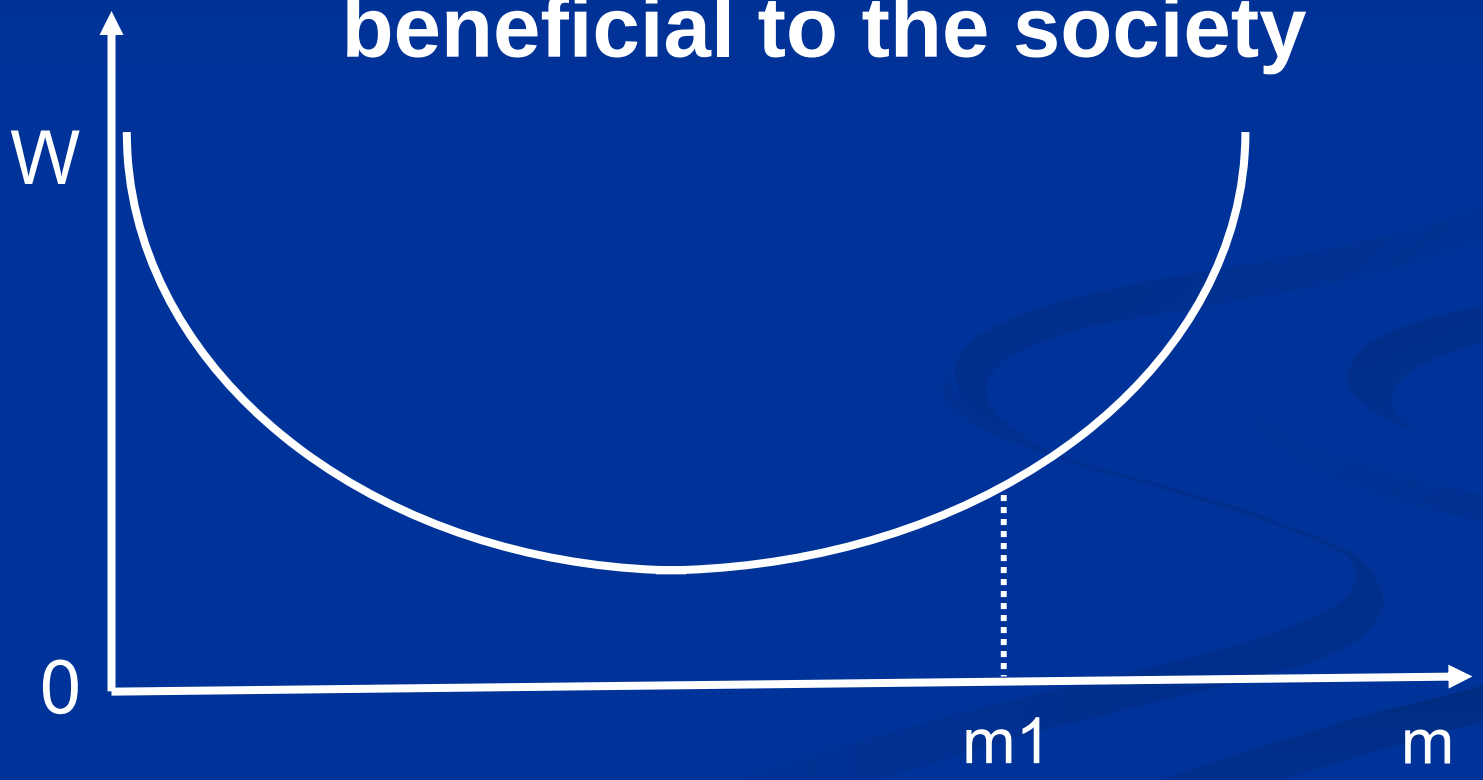
(3) W(m) is U-shaped if the cost difference between public firms and private firms are sufficiently small and N (the total number of firms) is large.

This is the most interesting case

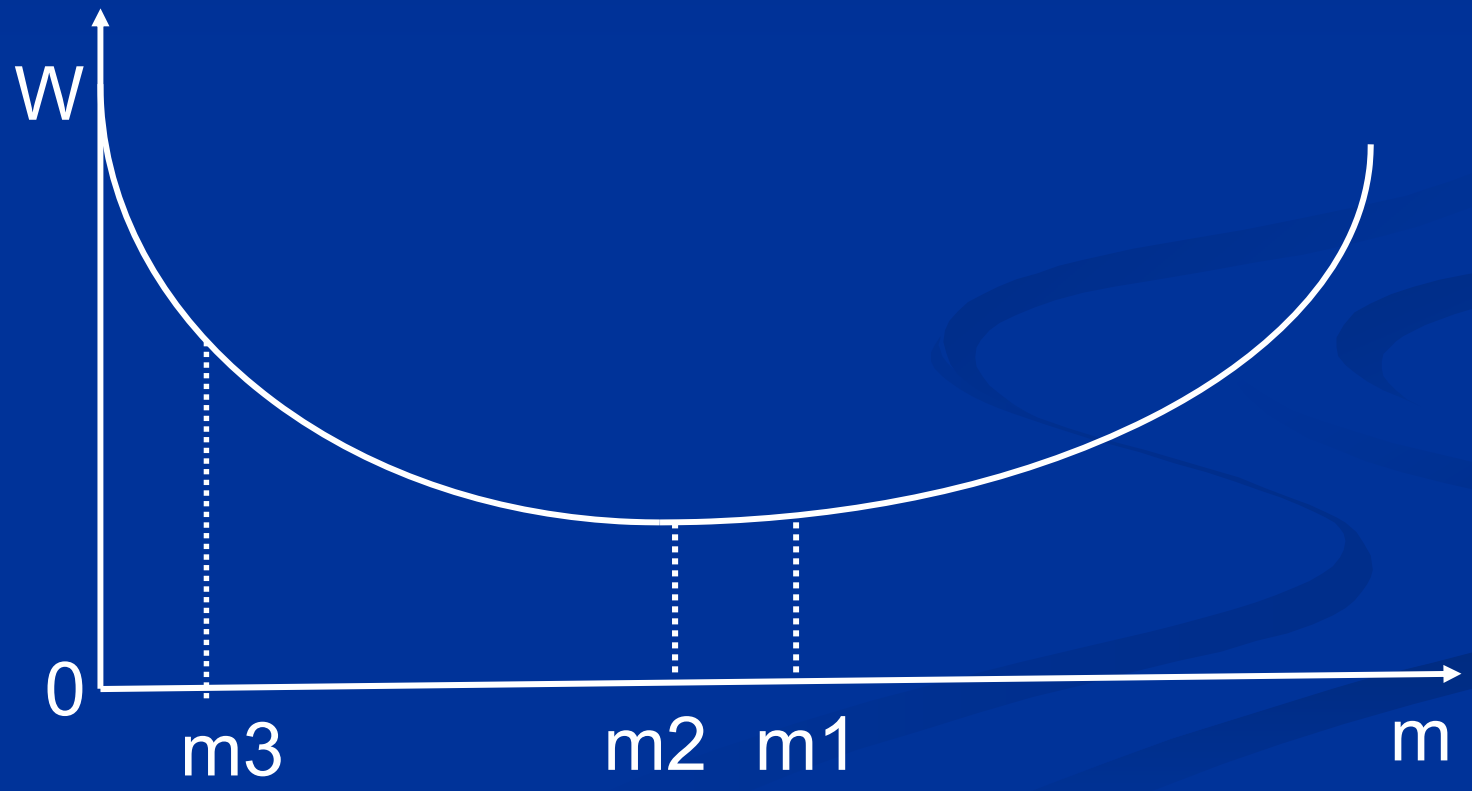
Result 3



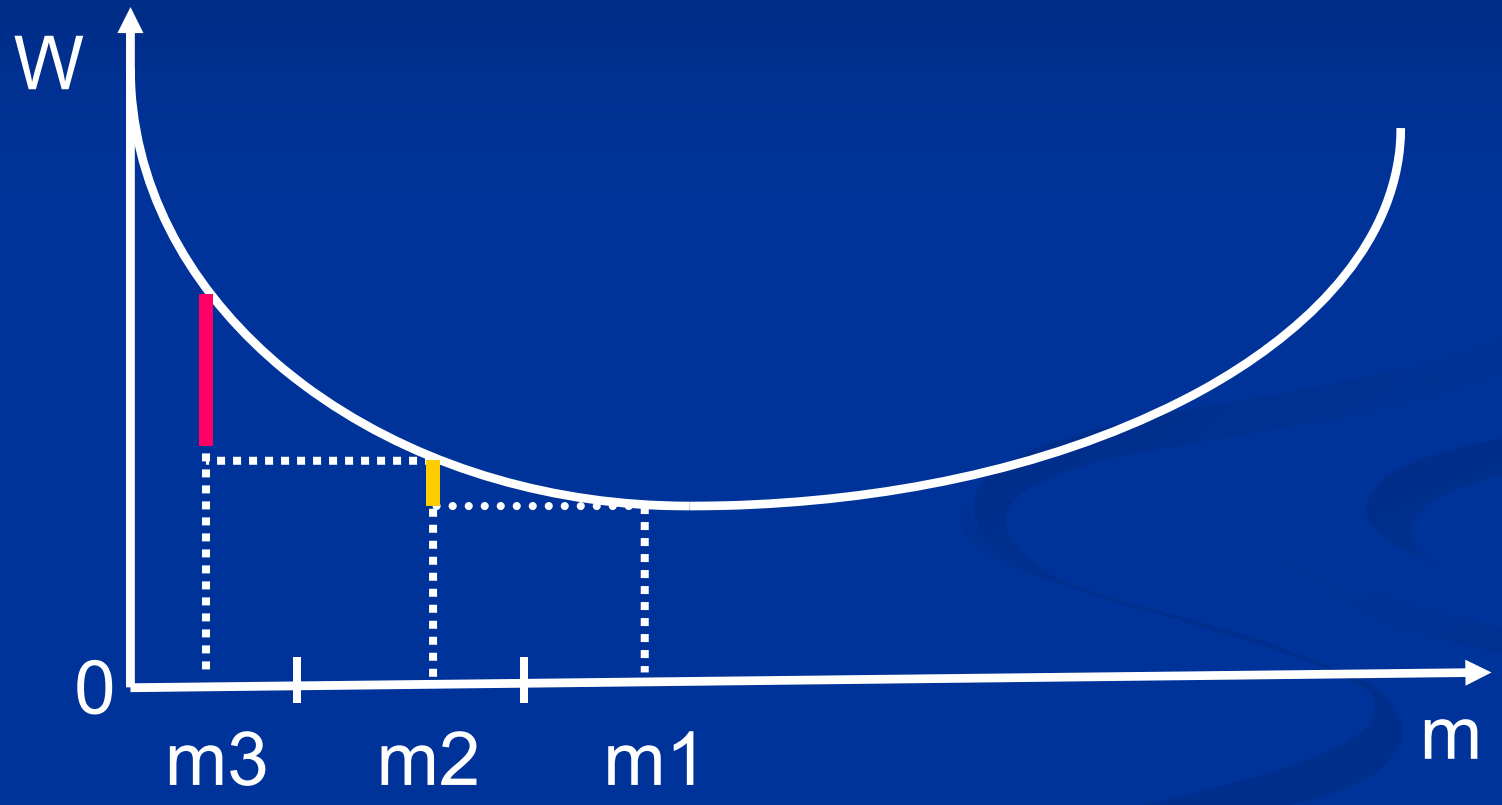
Even if privatization does not improve welfare at the early stages, it can eventually lead to a point such that privatizations after that point on are beneficial to the society



Larger scale privatization programs eventually more likely end up with great success



Welfare-gains of privatizations is accelerating



Intuition

Suppose that m public firms and N-m private firms exist. Suppose that one public firm is privatized.

→Production substitutions from the privatized firm to m-1 public firm and to N-m private firms take place.

→The former production substitution reduces welfare and the latter improves welfare.

→The latter becomes stronger when m is smaller and N is larger.

Implications

(1) Failures at early stages do not imply the failure of the whole privatization program (except for highly concentrated markets).

→We should evaluate privatization program from the long term viewpoint.

(2) Smaller size privatization programs more likely fail.

(3) Welfare-gains of privatizations are larger, the latter stage of privatization program is.

→Once we reach the critical stage, the privatization automatically proceeds with larger support.