2020年度寡占理論 (11)
Flexible Privatization Policy in Free-Entry Markets

今日の講義の構成

(a) 民営化のタイミング

(b) An Analysis of Entry-then-Privatization Model: Welfare and Policy Implications.

(c) Dynamic Privatization Policy

(d) Flexible Privatization Policy in Free-Entry Markets

(e) Mixed Duopoly: Differential Game Approach

報告論文情報

Title
(a) An Analysis of Entry-then-Privatization Model: Welfare and Policy Implications
(b) Dynamic Privatization Policy.
(c) Flexible Privatization Policy in Free-Entry Markets
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(c)Discussion Paper

Free Entry Markets in Mixed Oligopolies

Free Entry Equilibrium

In the first stage, the government chooses the degree of privatization α.
In the second stage, each private firm chooses whether or to enter the market.
In the third stage, all firms face Cournot competition.

Consider the subgame starting at the beginning of the second stage.
→The equilibrium price is independent of α.
（Matsumura and Kanda, 2005)

Long-Run Equilibrium under Cournot Competition

AC＞MC

P＞MR

AC

MC

D'

MR

D

0

equilibrium output of each firm
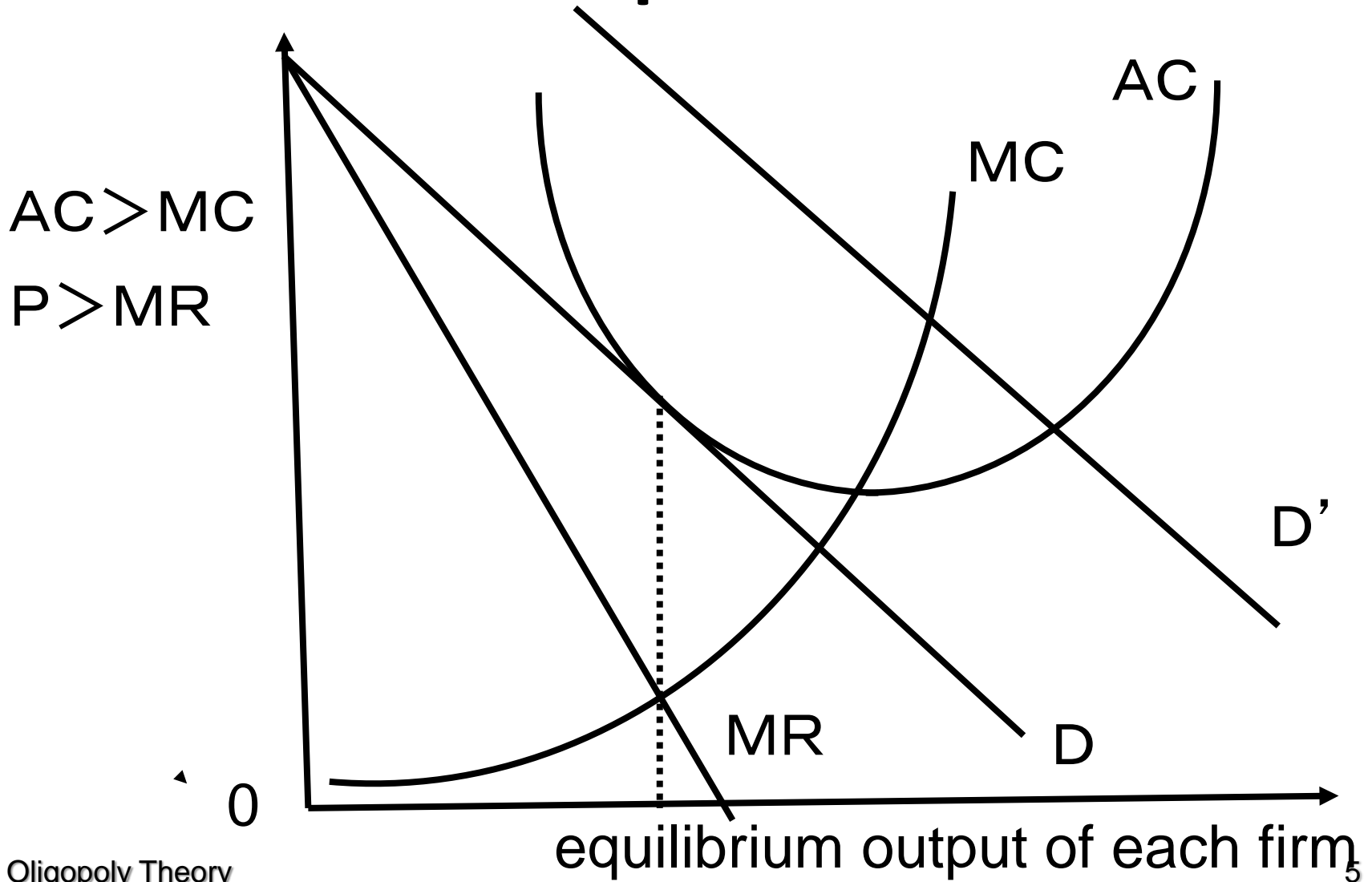
An Analysis of Entry-then-Privatization Model: Welfare and Policy Implications

Free Entry Equilibrium

Welfare = CS+ profit of the public firm (privatized firm).
CS is independent of α.
Price is independent of α.
→Only the public firm's profit matters.
Because the price is constant, marginal cost pricing is the best.

When the private firms are domestic, α=1 is optimal.←Matsumura and Kanda (2005).
The optimal degree of privatization is increasing in the foreign ownership share in private firms. ←Cato and Matsumura (2013).

Ex ante and ex post privatization

Ex ante privatization ~ The same time structure as Matsumura and Kanda (2005).

Ex post privatization

In the first stage, each private firm chooses whether or to enter the market.

In the second stage, the government chooses the degree of privatization.

In the third stage, all firms face Cournot competition.

Question: The equilibrium price of the ex ante privatization is (higher than, lower than, the same as) that in the ex post privatization model.

Ex ante and ex post privatization

Ex ante privatization ~ The same time structure as Matsumura and Kanda (2005).

Ex post privatization

In the first stage, each private firm chooses whether or to enter the market.

In the second stage, the government chooses the degree of privatization.

In the third stage, all firms face Cournot competition.

Answer: The equilibrium price of the ex ante privatization is the same as that in the ex post privatization model.

Ex post privatization

When foreign ownership share in private firms is small (large), the degree of ex post privatization is excessive (insufficient).

Dynamic Privatization Policy

Joint work with Susumu Sato

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 α. After observing α, firms compete in the product market.

Results

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

Optimal Degree of Privatization

Optimal degree of privatization depends on
(i) competition structure such as the number of private firms (Lin and Matsumura, 2012, Haraguchi et at. 2018), degree of competition (Matsumura and Okamura, 2015), product differentiation (Fujiwara, 2007), free entry or not (Matsumura and Kanda, 2005), competitive pressure from neighboring markets (Haraguchi et al, forthcoming)
(ii) timing of privatization (Lee et al, 2018)
(iii) existence of other policy instruments such as tax policy (Cato and Matsumura, 2013, 2015)
(iv) foreign penetration (Lin and Matsumura, 2012)
and so on.

Shadow Cost of Public Funding

One unit of tax revenue reduces $(1+\lambda)$ unit of CS +PS.
$\lambda \cdot$ (tax revenue)~ excess burden of taxation
$\rightarrow$ One unit additional revenue of the government has $(1+\lambda)$ value because it reduces excess burden of taxation in other markets.

If $\lambda=0$, the stock price of the public firm does not matter as long as the buyers of the privatized firm are domestic. If $\lambda >0$, the stock price of the public firm matters and the government has an incentive to raise the stock price and/or increase its profit.

Gradual Privatization

All of the papers mentioned above assumed that the governments privatize the public firms only once.

However, the governments often adjust the degree of privatization over time.
NTT, JT, JRs, Japan Post, Postal Bank, Kampo, Renault, and so on.

Degree of Privatization and the Shadow Cost of Public Funding

The more the government holds the share in the public firm, the more the government is concerned with its profit.

⇒In early stage privatization distorts latter stage latter stage privatization.

The degree of privatization may change over time even if no changes in demand or cost conditions exists.

The Model

Two period model.

Firm 0 ~ public firm

Firms 1,2,...n. ~ Private Firms.

The foreign ownership share in private firms is $\theta \in [0,1]$.

The government's objective is domestic welfare.

Each private firm's objective is its own profit.

Firm 0's is convex combination of welfare and its own profit.

Notations

α is the degree of privatization.

δ is the common discount factor.

R is the revenue from the stock-selling of the public firm.

D is the dividend that the government obtains from firm 0.

λ is the shadow cost of public funding.

Welfare

$W_t = CS_t + \pi_{\{0,t\}} + (1-\theta)$ (Private firms' profits in period t) $+ \lambda(R_t + D_t)$.

$R_1 = \alpha_1(\pi_{\{0,1\}} + \delta\pi_{\{0,2\}}) \sim$ financial market is complete
$R_2 = (\alpha_2 - \alpha_1)\pi_{\{0,2\}})$
$D_t = (1-\alpha_t)\pi_{\{0,t\}}$

The government maximizes $W_1 + \delta W_2$

The Time Line

In period 1, the government chooses α_1 and R_1 is realized.

Then firms face Cournot competition.

In period 2, the government chooses α_2 and R_2 is realized.

Then firms face Cournot competition.

Driving Force

In period 1, one unit increase in the profit of firm 0 increases welfare by $(1+\lambda)$ unit. $\rightarrow$non distorted incentive.

In period 2, the government has a distorted incentive.

In period 2, one unit increase in the profit of firm 0 increases welfare by $(1+\lambda) - \alpha_1\lambda$ unit. $\rightarrow$a distorted incentive.

In period 2, the government has a stronger incentive to improve CS at the cost of the profit of firm 0 unless $\alpha_1 = 0$.

So as to reduce this distortion, the government chooses smaller α_1 than the static optimal one, α^{**}.

Equilibrium outputs given α

Because the output has no dynamic effect, firm 0 chooses the same output in periods 1 and 2 as long as α remains unchanged.

$q_0(\alpha)$:the public firm's output.
$q(\alpha)$:the private firm's output.
$Q(\alpha)$:the total output.

Lemma 1:
$q_0(\alpha)$ and $Q(\alpha)$ are decreasing in α, and $q(\alpha)$ is increasing in α.

Benchmark: Optimal Degree of Privatization Chosen in Period 1

Suppose that the government can choose α_1 and α_2 in period 1.

Let α_t ** be this static optimal degree of privatization. (The case in which the government commit to its future privatization policy)

Benchmark: Optimal Degree of Privatization Chosen in Period 1

Lemma 2:

(i) $\alpha_1^{**} = \alpha_2^{**}$.

(ii) $\alpha_1^{**} = \alpha_2^{**} = \alpha^{**}=0$ if and only if $\theta(Q(0)-q_0(0)) + (1-\theta)q(0) - \lambda q_0(0) \leqq 0$. (full nationalization can be optimal if λ is positive cf Matsumura, 1998)$\Rightarrow$aggressive behavior can increase firm 0's profit and it may be optimal.

(iii) $\alpha^{**} <1$ if $\theta=1$ or $c_0(q)=c(q)$ for all q.

Equilibrium in the Second Period Subgame

Given α_1, the government chooses α_2.
Let $\alpha_2(\alpha_1)$ be the equilibrium α_2 αin in this subgame.

Results

Lemma 3:

$\alpha_2*(0) = \alpha_2**$.

←There is no distortion in period 2 if the government holds hole share in firm 0 at the beginning of period 1.

Results

Proposition 1:

(i) $\alpha_1^* \leqq \alpha^{**}$.

(ii) $\alpha_1^* = 0$ if and only if $\alpha^{**} = 0$.

(iii) $\alpha_1^* = 1$ if and only if $\alpha^{**} = 1$.

(iv) $\alpha_1^* = \alpha^{**} = 0$ if and only if $\theta(Q(0) - q_0(0)) + (1-\theta)q(0) - \lambda\, q_0(0) \leqq 0$.

(v) $\alpha_1^* < 1$ if $\theta = 1$ or $c_0(q) = c(q)$ for all q.

(vi) α_1^* is decreasing in δ if $(\alpha_1^*, \alpha_2^*) \in (0,1)^2$

←The larger δ is, the more important future welfare is, and thus lower the degree of privatization in period 1 is.

(vii) $\alpha_2^* - \alpha^*$ is decreasing in δ if $(\alpha_1^*, \alpha_2^*) \in (0,1)^2$

Results

If $\alpha^{**}=0$, then $\alpha_1^* = \alpha_2^*=0$.

Results

Proposition 2:

Suppose that $p(Q) = a-Q$ and $c_0(q) = c(q) = q^2/2$.

(i) $\alpha_2^* > \alpha^{**}$ if and only if $\theta < \theta(n) := (n^2-8)/(3n(n+4))$, and $\theta(n)$ is increasing in n.

When the number of the firms is large and foreign ownership share is small, the degree of privatization eventually exceeds the optimal degree of privatization.

Results

Proposition 2:

Suppose that $p(Q) = a-Q$ and $c_0(q) = c(q) = q^2/2$.

(ii) $\alpha_1^* = \alpha_2^* = \alpha^{**} = 0$ if and only if

$g(n,\lambda,\theta) := (n-1) \theta (2+\lambda) + 2(1-\lambda^2) - \lambda\theta - n\theta^2 \leqq 0$.

(iii) $g(n,\lambda,\theta) \leqq 0$ only if $n <2$, and $g(n,\lambda,\theta)$ is decreasing in both λ and θ for n<2.

The government holds hole share in the public firm (and thus the degree of privatization does not change) only if there is one private firm, the excess burden of taxation is large, and foreign ownership share is large.

$\Rightarrow$only very limited case. Possible risk for analyzing duopoly model in mixed oligopolies

Results

Lemma 4:

Under the linear demand and quadratic cost specified in Proposition 2, $\alpha_2{}^* > \alpha_1{}^*$ if $\theta < \theta(n)$.

Note that $\theta(n) := (n^2-8)/(3n(n+4))$ and $\theta(n)$ is increasing in n.

Results

Proposition 3:
(i) If $\alpha^{**} = 1$, then $\alpha_1^* = \alpha_2^* = \alpha^{**} = 1$.
(ii) Even if $\alpha^{**} < 1$, α_2^* can be one.

Summary

(1) Early stage privatization distorts the latter stage privatization. →commitment not to adjust privatization policy over time improves welfare.
(2) Gradual privatization appears under reasonable conditions.
(3) If full privatization is optimal, the government fully privatizes at the early stage, but the government fully privatizes the public firm at the latter stage even if it is not optimal.

Flexible Privatization Policy in Free Entry Markets

Joint work with Susumu Sato

Matsumura and Kanda (2005)

Privatization-then Entry Model

In the first stage, the government chooses the degree of privatization α.

In the second stage, each private firm (domestic firm) chooses whether or to enter the market.

In the third stage, all firms face Cournot competition.

Consider the subgame starting at the beginning of the second stage.

→The equilibrium price is independent of α

~ the output of each firm is independent of α.

An increase in α increases the total output of private sector but it affects the number of the entering firms only.

Long-Run Equilibrium under Cournot Competition

AC＞MC

P＞MR

AC

MC

D'

MR

D

0

equilibrium output of each firm
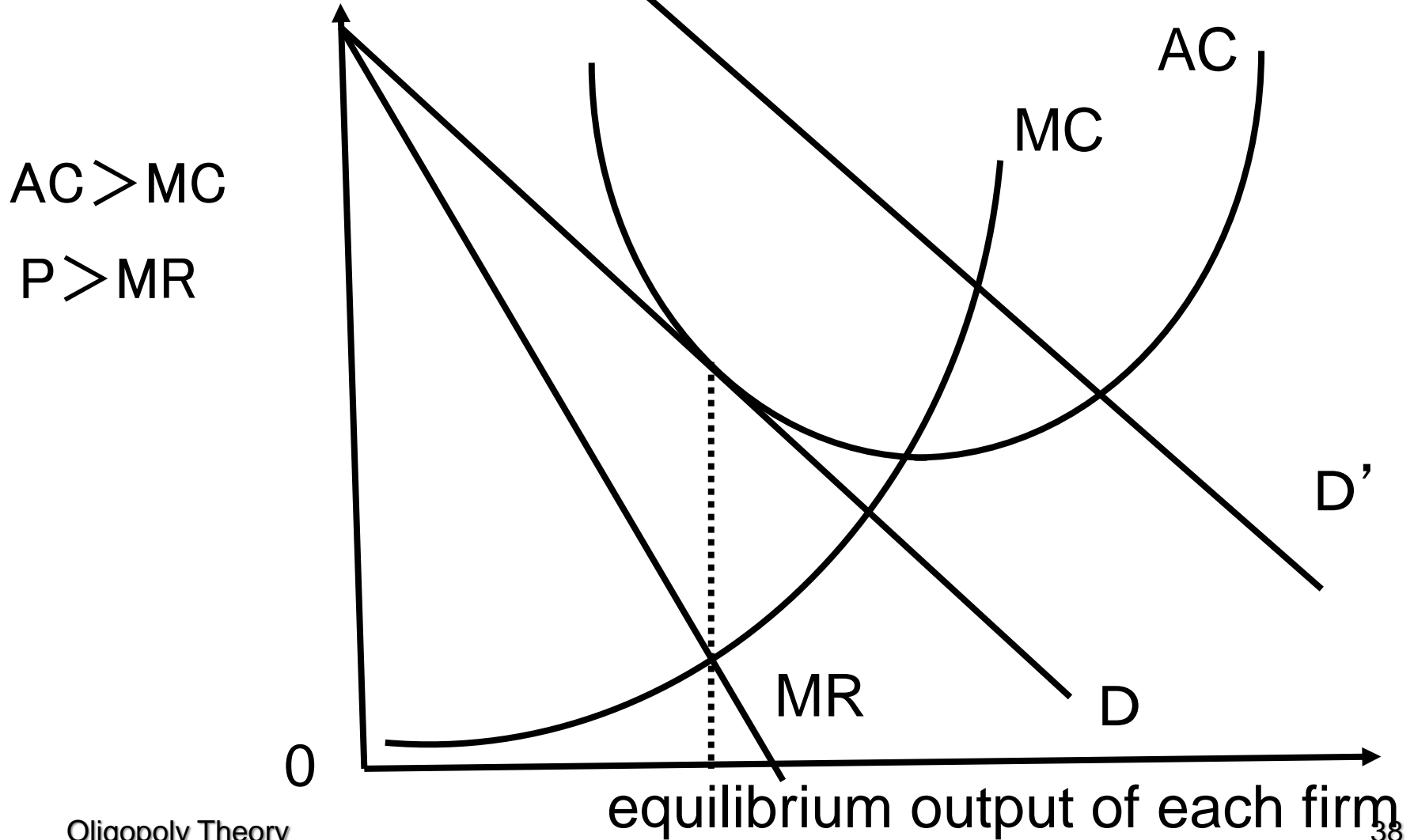
Welfare in Free Entry Equilibrium

Welfare = CS+ profit of the public firm (privatized firm).

CS is independent of α.

Price is independent of α.

→Only the public firm's profit matters.

Because the price is constant, marginal cost pricing is the best.

Cato and Matsumura (2012)

The foreign ownership share in private firms is θ∈[0,1]
The extension of Matsumura and Kanda (2005) (θ=0).

The equilibrium price is independent of α and θ.
The public firm's output is increasing in θ and decreasing in α.
Because the price is constant, marginal cost pricing is the best.
→The optimal degree of privatization is increasing in θ, which is in contrast to that of non free entry market model (Lin and Matsumura, 2012).

Entry-then-Privatization Model

In the first stage, each private firm chooses whether or to enter the market. (The foreign ownership share in private firms is θ∈[0,1].)
In the second stage, the government chooses the degree of privatization.
In the third stage, all firms face Cournot competition.

Consider the subgames starting at the beginning of the second stage. These subgames are the same as those at non-free-entry markets.
Partial privatization is optimal (Matsumura, 1998)

Entry-then-Privatization Model

In the first stage, each private firm chooses whether or to enter the market. ~zero profit condition.

The equilibrium price is the same as that in privatization-then-entry model.

Lee et al. 2018
The equilibrium degree of privatization is larger (smaller) than the privatization-then-entry model.
Welfare is greater in the privatization-then-entry model.

Our Paper

(1) The government chooses the degree of privatization.
(2) Private firms enter the market.
(3) The government again chooses the degree of privatization.

The government intentionally (strategically) chooses before entry privatization policy to distort the post-entry privatization policy.

The Model

Free entry market

Cournot competition, one public firm compete against private firms.

With excess burden of taxation

In the first stage, the government chooses the degree of privatization. In the second stage, private firms enter the market. In the third stage, the government adjusts the degree of privatization. In the fourth stage, firms face Cournot competition.

Time Inconsistency

Ex ante privatization
Social welfare = CS + firm 0's profit because private firms' profit is zero.
CS is independent of the privatization policy
⇒The government chooses the privatization policy to maximize firm0's profit.

After the entry, the entry costs have already been sunk. At that stage, the privatization policy affects CS and private firms' profit.
⇒The government's incentive changes after the entry.

なぜ参入前の民営化政策に意味があるのか？

税の超過負担がある～これがないケースよりも株価が上がる（利益が増える）利益が大きくなる。

参入前に一部株を売っている⇒利潤動機が小さくなるという歪みが発生
この歪みを戦略的に利用してtime inconsistencyの問題を軽減する＝事後の民営化政策を、事前にコミットできるケースの民営化政策に一致させる（近づける）ように事前にあえて株を売る。

参入前の民営化政策の性質

私企業の外国人持ち株比率が低い〜参入後に民営化の程度がtime inconsistencyの結果最適値より高くなる
〜参入前の民営化でこの誘因を減らせる場合には参入前に民営化する。
この誘因を減らせるのは外国人持ち株比率が一定以上の時のみ。
⇒外国人持ち株比率が余り高くなく、低くない一定の範囲にあるときのみ、事前の民営化に意味がある。
私企業の外国人持ち株比率が高い〜参入後に民営化の程度がtime inconsistencyの結果最適値より低くなる

参入前の民営化政策の性質

私企業の外国人持ち株比率が高い〜参入後に民営化の程度がtime inconsistencyの結果最適値より低くなる
〜参入前の民営化でこの誘因を増やせる場合には参入前に民営化する。
でもこのケースでは必ず事前の民営化で事後の民営化の誘因を更に小さくしてしまう。
⇒均衡において事前の民営化をしない。

私企業の外国人持ち株比率が低くても高くても事前の民営化はwelfareを悪化させるが、中間にあるときには改善する。

Thank you very much for your kind attention!!

非常感謝!!