Optimal Merger Regulation under Asymmetric Information

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Problem

- Trade-off in mergers: efficiency vs less competition
- Antitrust Authority (AA): Can either block or propose remedies
- Problem: AA does not know firms production technologies

Goal: Characterize the optimal merger rule

Approach: Mechanism design

Results

General

- Provide the optimal rule in the complete information case as a benchmark
- Provide the optimal rule in the incomplete information case
- Show distortions

Specific

- Characterize IC condition
- Use that condition to solve AA problem

Model

Firms

- Firms $I = \{1, 2, 3\}$
- Cost function $C_i(q_i, \theta_i, k_i) = \theta_i(\overline{k} - k_i)q_i$
- Demand $Q = 1 - P(Q)$
- Competition in quantities (Cournot)
- Profit $\pi_i(\theta, k)$

A Merger change the number of firms and firm's capital structure

- $M = \{1, 2\}$.Then $I' = \{M, 3\}$
- Merger M determines (θ', k') such that $\theta'_M = \mu(\theta_1, \theta_2)$ and $k'_M = k_1 + k_2$
- Gains from merger M:

$$\Delta\pi_i(\theta, k) = \begin{cases} \pi_M(\theta', k') - [\pi_1(\theta, k) + \pi_2(\theta, k)] & \text{if } i = M \\ \pi_3(\theta', k') - \pi_3(\theta, k) & \text{if } i = 3. \end{cases}$$

AA maximizes $\Delta CS(\theta, k) = CS(\theta', k') - CS(\theta, k)$
For that, AA has two tools available:

- $x : \Theta \to \{0, 1\}$; Decision to block
- $\delta_3 : \Theta \to \mathbb{R}_+$; Remedies (transfers of capital or divestitures)

Any δ_3 defines a new capital structure with $k'_M = k_1 + k_2 - \delta_3$ and $k'_3 = k_3 + \delta_3$
Instead of using k', we will use δ_3

AA Problem

Problem

$$\max_{x(\theta),\delta(\theta)} \int_{\Theta} x(\theta)\Delta CS(\theta,\delta(\theta))dF(\theta)$$

subject to:
(IC)

$$(\theta_1,\theta_2) = arg \max_{(\theta_1',\theta_2')} x(\theta_1',\theta_2',\theta_3)\Delta\pi_M(\theta,\delta(\theta_1',\theta_2',\theta_3))$$

$$\theta_3 = arg \max_{\theta_3} x(\theta_1,\theta_2,\theta_3')\Delta\pi_3(\theta,\delta(\theta_1,\theta_2,\theta_3'))$$

(IR)

$$x(\theta)\Delta\pi_M(\theta,\delta(\theta)) \geq 0$$

$$x(\theta)\Delta\pi_3(\theta,\delta(\theta)) \geq 0$$

Incomplete Information

Consider firm $i \in \{M, 3\}$.

IC Condition

If a merger rule (x, δ) is (IC), then:

(i) $\delta_i(\theta) = \delta_i(\theta_{-i})$

(ii) If $\Delta\pi_i(\theta, \delta_i(\theta_{-i})) < 0$, then $x(\theta) = 0$.

(iii) If $\Delta\pi_i(\theta, \delta(\theta_{-i})) > 0$, then $x(\theta) = 1$.

A firm's report affect on $x(\theta_i, \theta_{-i})$ and $\delta(\theta_i, \theta_{-i})$.
Idea: Consider the two kind of deviations separately

Induced $x(\theta)$

Given a vector $\delta(\theta)$ that satisfies own-report independence, there is only one $x(\theta)$ such that (x, δ) is incentive-compatible.

Define $I(\delta) = \{\theta : \Delta\pi_i(\theta, \delta) \geq 0, i = \{M, 3\}\}$ and set

$$x(\theta) = \begin{cases} 1 & \text{if } \theta \in I(\delta) \\ 0 & \text{in other case.} \end{cases}$$

Characterization

A merger rule is (IC) if and only if $\delta \geq 0$ and $x(\theta)$ is the one induced by δ

Incomplete Information

AA problem...

$$\max_{x(\theta),\delta(\theta)} \int_{\Theta} x(\theta)\Delta CS(\theta,\delta(\theta))dF(\theta)$$

subject to:

(IC)

$$(\theta_1,\theta_2) = arg \max_{(\theta_1',\theta_2')} x(\theta_1',\theta_2',\theta_3)\Delta\pi_M(\theta,\delta(\theta_1',\theta_2',\theta_3))$$

$$\theta_3 = arg \max_{\theta_3} x(\theta_1,\theta_2,\theta_3')\Delta\pi_3(\theta,\delta(\theta_1,\theta_2,\theta_3'))$$

(IR)

$$x(\theta)\Delta\pi_M(\theta,\delta(\theta)) \geq 0$$

$$x(\theta)\Delta\pi_3(\theta,\delta(\theta)) \geq 0$$

...can be rewritten as:

$$\max_{\delta \geq 0} \int_{\Theta} \Delta CS(\theta, \delta) \mathbb{1}_{I(\delta)}(\theta) dF(\theta)$$

And then...

Optimal merger rule

The optimal merger rule (x, δ^*) among (IR) and (IC) is:

$$x(\theta) = \begin{cases} 1 & \text{if } \theta \in I(\delta^*) \\ 0 & \text{in other case.} \end{cases}$$

$$\delta^* = arg \max_{\delta \geq 0} \int_{\Theta} \Delta CS(\theta, \delta) \mathbb{1}_{I(\delta)}(\theta) dF(\theta)$$

Comparison

- Every rejected merge would improve consumer surplus.
- Every merge that decrease consumer surplus would be approved.
- Every merge rightly approved would be asked less divestitures than the optimal one (under-fixing effect).

Conclusions

- We solved AA problem using mechanism design approach
- Characterization of IC allow us to simplify AA problem
- Distortions are explored

Thanks!