Raising Rival's Quality Cost

Exclusive Input Ownership and Competition

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Firms compete both in *quality* & *price*. The input raises the cost of quality provision. The exclusive owner raises its quality, but also increases its price.

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With exogenous quality, exclusive access to a cost reducing technology raises a rival's cost, so raises prices and harms consumers.	Firms compete both in *quality* & *price*. The input raises the cost of quality provision. The exclusive owner raises its quality, but also increases its price.

- Firms first compete for access to the input; then they choose quality and price.
- Exclusivity is the unique equilibrium because it raises industry profit.
- Consumer harm depends on the intensity of competition and who obtains exclusivity.

Example: Illumina/GRAIL merger

- GRAIL develops multi-cancer early-detection tests.
- Illumina supplies sequencing technology used to develop and process these tests.
- The transaction was challenged on the theory that Illumina could weaken rivals' access to an essential sequencing input.
- Illumina subsequently completed a GRAIL divestiture in 2024.

Sources: FTC Illumina/GRAIL proceedings; European Commission M.10188; Illumina 2024 divestiture announcement.

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In the model's language

The input affects rivals' cost of improving quality: sensitivity, specificity, robustness, and regulatory approval.

Contribution relative to the literature

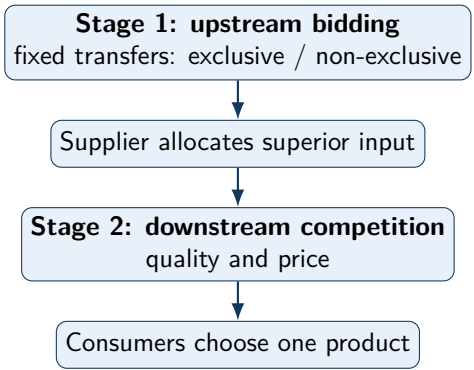
Closest literatures

- **Exclusive dealing / foreclosure**
  Aghion–Bolton; Rasmussen–Ramseyer–Wiley; Bernheim–Whinston; Segal–Whinston.
  Mechanisms: exclusion, coordination failures, contracting externalities.
- **Exclusive licensing**
  Kamien–Tauman; Katz–Shapiro; Sen–Tauman.
  Focus: licensing format and rent sharing for cost-reducing technologies.
- **Platforms / exclusive content**
  Armstrong–Wright; Hagiu–Lee; Lee; Carroni et al.; Martimort–Pouyet.
  Focus: multihoming, network effects, content exclusivity.

Point of departure

1. The input lowers the *cost of quality provision*, not production cost.
2. Downstream firms choose both *quality* and *price*; higher quality need not imply higher net utility.
3. Demand curvature determines the consumer-surplus sign.
4. The policy counterfactual is endogenous: a partial ban can reallocate exclusivity rather than induce sharing.

Model in one picture



Contracting restriction

Contracts cannot be conditioned on downstream quality.

Covered Market Discrete Choice Demand

$$U_{ij} = u_j + \varepsilon_{ij}, \qquad u_j = q_j - p_j.$$

$$D \equiv u_B - u_S = (q_B - p_B) - (q_S - p_S).$$

A consumer chooses B iff $\varepsilon_{iS} - \varepsilon_{iB} \leq D$.

$$\text{share}_B = F(D), \qquad \text{share}_S = 1 - F(D)$$

where F is the c.d.f. of $\Delta\varepsilon_i = \varepsilon_{iS} - \varepsilon_{iB}$.

Quadratic quality cost

$$C_j(q_j) = \frac{\kappa_j}{2} q_j^2, \qquad \kappa_j = \begin{cases} c/v_M & \text{with input,} \\ c & \text{without input.} \end{cases}$$

Market competitiveness: why $f(0)$ matters

- At equal net utilities ($D = 0$), consumers with $\Delta\varepsilon_i \approx 0$ are marginal.
- Higher $f(0)$ means more consumers are close to indifferent, so competition is stronger.
- Higher $f(0)$ also means lower symmetric markups, $p^{NE} = 1/[2f(0)]$.

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Uniform / Hotelling

$$\Delta\varepsilon \sim U[-L, L] \quad \Rightarrow \quad f(0) = \frac{1}{2L}.$$

Increasing L spreads a unit mass of consumers over a wider taste interval. The margin becomes thinner, so competition weakens.

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Logit

$$f(0) = \frac{F(0)[1 - F(0)]}{\sigma} = \frac{1}{4\sigma}.$$

A larger σ lowers central density and weakens competition.

Downstream equilibrium: what exclusivity moves

Prices

$$p_B = \frac{F(D)}{f(D)}, \qquad p_S = \frac{1 - F(D)}{f(D)}.$$

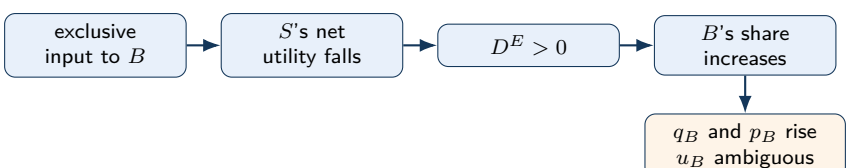
When local density $f(D)$ is low, fewer marginal consumers increase price.

Qualities

$$q_B = \frac{F(D)}{\kappa_B}, \qquad q_S = \frac{1 - F(D)}{\kappa_S}.$$

Quality is higher with larger demand and lowermarginal cost of quality, κ_j.

Exclusivity increases the demand of the input owner.



Result 1: exclusivity is the unique equilibrium

Proposition 1

If the effective marginal cost of the exclusive owner of the input is sufficiently high relative to the competitiveness of the market

$$\frac{c}{v_M} > \frac{2f(0)}{3},$$

there exists a unique equilibrium in both exclusive and none exclusive subgames. The unique equilibrium outcome is the exclusive ownership of input.

Intuition: The total industry profit is higher under exclusivity than under non-exclusivity as the exclusivity generates more differentiation.

Result 2: The net utility offer of the exclusive owner might increase

- Assume firm B has exclusivity. Relative to non-exclusivity,

$$D^E > D^{NE} = 0, \qquad F(D^E) > F(0) = \frac{1}{2}$$

- Excluded firm's offer worsens: $q_S^E \downarrow, \quad p_S^E \downarrow, \quad u_S^E - u_S^{NE} < 0.$
- Exclusive firm's offer might improve: $q_B^E \uparrow, \quad p_B^E \uparrow, \quad \text{sign}(u_B^E - u_B^{NE})$ ambiguous.

Necessary and sufficient condition for winner's net utility to increase

$$u_B^E > u_B^{NE} \iff \frac{c}{v_M} \leq \frac{F(D^E) - \frac{1}{2}}{\frac{F(D^E)}{f(D^E)} - \frac{1}{2f(0)}}$$

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Sufficient condition for harm to all consumers

$$\frac{c}{v_M} > f(0) \quad \Rightarrow \quad \begin{cases} u_B^E < u_B^{NE}, \\ u_S^E < u_S^{NE}. \end{cases}$$

Consumer surplus: Benefits from higher quality and losses from mismatch (asymmetry)

$$CS^E - CS^{NE} = \underbrace{(u_B^E - u_B^{NE})}_{\text{owner's net-utility effect}} - \underbrace{\int_0^{D^E} [1 - F(x)]\, dx}_{\text{taste-mismatch loss}}.$$

Stay with B

Gain if B's net utility rises.

Stay with S

Lose because the excluded firm offers lower net utility.

Switch from S to B

Incur mismatch costs.

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Stay with B	Stay with S	Switch from S to B
Gain if B's net utility rises.	Lose because the excluded firm offers lower net utility.	Incur mismatch costs.

Consumers gain only if the exclusive firm's net-utility improvement dominates the mismatch loss.

Consumer surplus might rise with exclusivity

Uniform / Hotelling

Consumer surplus rises if sufficiently strong competition:

$$CS^E > CS^{NE} \iff \frac{v_M}{3c} < L < \widetilde{L}.$$

Welfare rises on a larger set:

$$W^E > W^{NE} \iff \frac{v_M}{3c} < L < \widehat{L}, \quad \text{with} \quad \widetilde{L} < \widehat{L}.$$

The density is flat, so strong competition can make the owner's net-utility gain dominate mismatch costs. Lower L means stronger competition.

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Logit

Consumer surplus always falls:

$$CS^E < CS^{NE}.$$

Welfare may still rise:

$$W^E > W^{NE} \iff \frac{v_M}{6c} < \sigma < \bar{\sigma}_W(c, v_M).$$

As one firm gains share, logit demand becomes locally thinner; markup and mismatch effects dominate for consumers. Lower σ means stronger competition.

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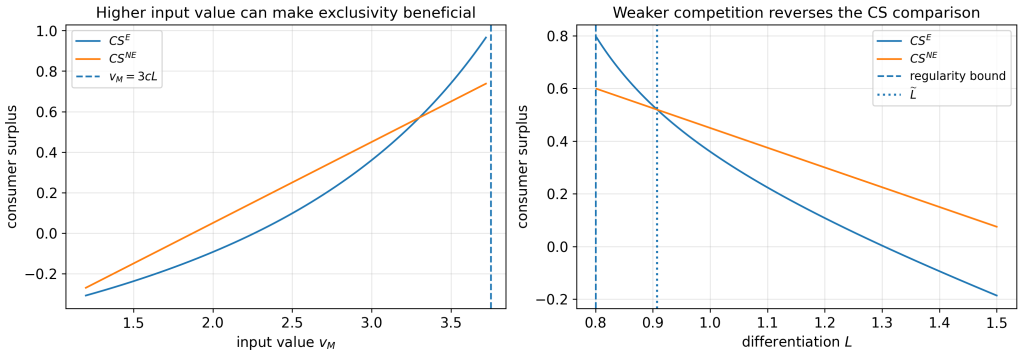
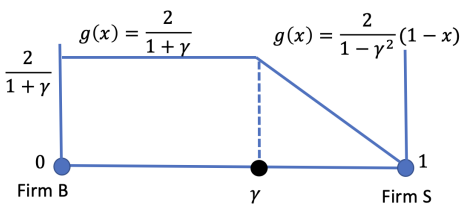
Uniform demand: where consumers gain



- High v_M lowers costs of quality provision so increases B incentives to offer higher net utility.
- Increasing L corresponds to reducing the level of competition, so firm B offers lower net utility with exclusivity than the non-exclusivity.

Demand asymmetry: the large-demand firm wins



Asymmetric demand

$$F(0) = \frac{1}{1+\gamma} > \frac{1}{2}, \qquad \gamma < 1.$$

Lower γ means a larger baseline demand advantage for firm B.

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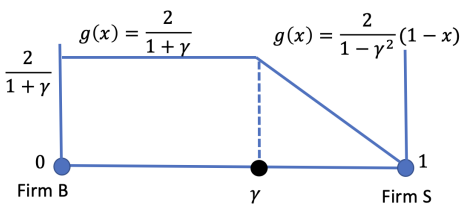

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Result

$$\Pi^{EB} > \Pi^{ES}, \qquad \Pi^{EB} > \Pi^{NE}.$$

The large-demand firm obtains exclusivity under laissez-faire.

Demand asymmetry mitigates consumer harm

Starting from the symmetric limit $\gamma = 1$, a small decrease in γ gives firm B a demand advantage. Locally,

$$\frac{d}{d\gamma}(CS^{EB} - CS^{NE})\Big|_{\gamma=1} < 0,$$
$$\frac{d}{d\gamma}(W^{EB} - W^{NE})\Big|_{\gamma=1} < 0.$$

Since asymmetry rises as γ falls, the welfare and CS gaps move upward with asymmetry.

- Under laissez-faire, the quality-cost reduction is assigned to the firm already serving more consumers.
- This raises the demand-weighted value of the quality improvement and makes the condition for higher owner net utility easier to satisfy.

Policy counterfactuals: complete versus partial ban

Three policy regimes

No ban: EB
large-demand firm has exclusivity

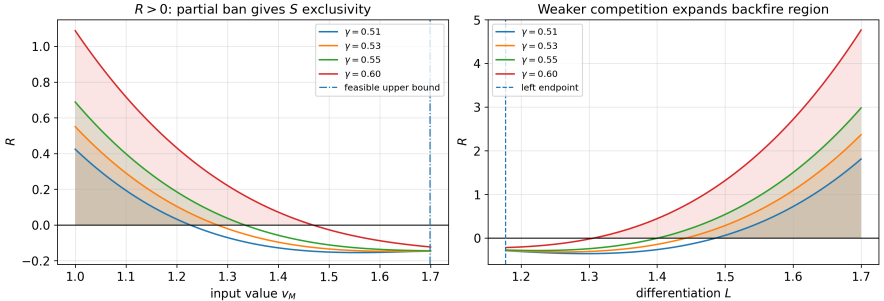
Complete ban: NE
both firms have the input

Partial ban: NE or ES
sharing, or small-firm exclusivity

Exclusivity under a partial ban

- B can pay to block S-exclusivity; S can pay to obtain it.
- If $\Pi^{NE} > \Pi^{ES}$, the partial ban yields sharing.
- If $\Pi^{ES} > \Pi^{NE}$, the partial ban reallocates exclusivity to S.
- The counterfactual is an equilibrium object, not a mechanical move to sharing.

Partial ban: when it backfires



Reading the figure

Shaded regions: Partial ban yields ES, not sharing. Exclusivity goes to the small-demand firm:

$$CS^{EB} > CS^{ES}, \qquad W^{EB} > W^{ES}.$$

Main takeaways

- Exclusivity over a quality-cost-reducing input raises total industry profit.
- Net utility change depends on effective marginal cost versus market competitiveness and demand curvature.
- The owner gains share and raises quality, but its net utility may still fall if price rises enough.
- Consumer surplus is determined by a net-utility effect minus a taste-mismatch loss.
- Uniform and logit demands generate different consumer-surplus predictions.

Main Takeaways

- Demand asymmetry can mitigate harm because the large firm values quality improvement for more consumers, making positive net-utility pass-through more likely.
- Large-firm-only bans can backfire by reallocating exclusivity to the lower-demand firm.

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Thank you