

Analysis of Markets with Vertical Integration

Roman Inderst, University of Frankfurt and Imperial
Tommaso Valletti, Imperial and University of Rome II

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- *Incentives* for input foreclosure
→ Current interest: Non-horizontal guidelines.
 - **Assessment of market power in input markets: Direct vs. Indirect constraints**
→ **Current interest: i) Schneider/Legrand and ii) Regulation of Electronic Communication (broadband)**
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 - Non-integrated supplier is his own worst competitor!
 - Irrelevance of upstream market structure ("direct constraints").
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 - Non-observable contracts: Extreme opportunism problem without integration.
 - Non-integrated supplier is his own worst competitor!
 - Irrelevance of upstream market structure ("direct constraints").
 - Irrelevance of "indirect constraints".
 - **Observable contracts:**
 - Serious "non-existence" problems in case of downstream "multi-homing".
 - Single-homing: "Dominant" supplier monopolizes downstream market.
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 - **For study of "indirect constraints"**
 - > "Two-stage Cournot" model (a la Salinger 1988)
 - > Despite the conceptual criticism!
 - **For study of "incentives to foreclose"** need a novel, richer model
 - > Two-stage price setting game with imperfect substitutes upstream
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Incentives to Foreclose

- Extant approaches:
 - Upstream Cournot: Salinger (1988)
 - > Conceptual criticism
 - > More important: Not sufficiently rich to support theories of incentives to foreclose
 - Ordover, Saloner, and Salop (1990): Upstream price competition, "very particular" timing.
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 - > More important: Not sufficiently rich to support theories of incentives to foreclose
 - Ordoover, Saloner, and Salop (1990): Upstream price competition, "very particular" timing.
 - **Our approach:**
 - **Simple two-stage price competition: No conceptual problems.**
 - **Differentiated upstream products (akin to demand theory)**
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→ Intuition: "Replacement effect" under price competition.
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- "Standard" quantity competition approach overstates incentives to foreclose
→ Intuition: "Replacement effect" under price competition.
 - **Corollary: Price vs. quantity competition upstream**
 - **Price competition → Lower US, higher DS margin.**
 - **But: Less incentives to foreclose.**
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 - Higher upstream, lower downstream margins.
 - But: (1) Higher impact ("pass-through") and (2) higher benefit of downstream cost advantage.
 - **Trade-off! With linear demand second effect stronger**
 - **Higher US / lower DS margins imply higher incentives to foreclose**
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 - **In sum:**
 1. **Focus on levels of pre-merger margins insufficient!**
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 - In sum:
 1. Focus on *levels* of pre-merger margins insufficient!
-> Ignores role of price impact ("pass-through").
 2. **No robust relationship between margins and incentives**
-> **Ask: Why are margins high/low in the first place?**
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Production

- $m \in M = \{1, \dots, M\}$ different inputs; $n \in N := \{1, \dots, N\}$ final goods.
 - Simplification: One-to-one production
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 - > Good n : $q_n := \sum_{m \in M} q_n^m$
 - > Input m : $q^m := \sum_{n \in N} q_n^m$
- **Cost of production for n :**

$$C(q_n) := \min_{q_n^m \geq 0 \text{ s.t. } \sum_{m \in M} q_n^m = q_n} \left\{ \sum_{m=1, \dots, M} \left[\delta (q_n^m)^2 / 2 + q_n^m (p^m + \beta) \right] \right\}$$

- > $\beta \geq 0$ represents constant marginal cost;
- > $\delta > 0$ represents a measure of input differentiation

$$q_n^m - q_n^{m'} = \frac{1}{\delta} (p^{m'} - p^m)$$

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→ Total production costs stay constant as only N changes.
- **We obtain with $\bar{p}_\emptyset := \sum_{m \in M} p^m / M$ and $\hat{\delta} := \delta / K$**

$$C'_k(q_n) = \bar{p}_\emptyset + \beta + \hat{\delta} \frac{N}{M} q_n.$$

- **Likewise, if only $M - 1$ inputs used: With $\bar{p}'_\emptyset := \sum_{m=2, \dots, M} p^m / (M - 1)$**

$$C'_k(q_n) = \bar{p}'_\emptyset + \beta + \hat{\delta} \frac{N}{M - 1} q_n.$$

General Procedure: Incentives to Foreclose

- Specification:
 - One DS firm owns $n = 1, \dots, f$ products. (Here: capacity)
 - Input $m = 1$ provided strategically. Input $m = 2$ competitively.
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 - Pre-merger: (1) Obtain "derived demand"; (2) Solve upstream.
 - **Vertical integration of $n = m = 1$: Incentives to still participate?**
 - > **Suppose not: Solve for equilibrium.**
 - > **Back out p^1 where $q^1 = 0$.**
 - > **VI-firm's profit impact from marginal reduction in p^1 ?**
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Downstream Homogeneous Cournot

Obtain some general insights:

- No "full foreclosure" even as upstream margin goes to zero as
 - $c^{m=2} = \bar{c}$ becomes equal to $c^{m=1}$ (which is normalized to zero);
 - δ (differentiation) goes to zero.
 - Role of "pass through" rate: High \rightarrow Higher incentives to foreclose.
-

DS Linear Demand

- Levitan and Shubik (1980):

$$q_n = \frac{1}{N} \left[1 - p_n - \theta \left(p_n - \frac{\sum_{n' \in N} p_{n'}}{N} \right) \right]$$

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- Cournot DS: Never full foreclosure
→ Effect of US price competition (instead of quantity competition!)
- **Bertrand: Never full foreclosure when θ low; but when $\theta \rightarrow 0$, then if**

$$\frac{f}{N} > 2 \frac{1 + \hat{\delta}}{4 + \hat{\delta}}.$$

i.e., if (i) high pre-merger market share f/N ; (ii) low upstream differentiation $\hat{\delta}$.

Incentives for (Full) Foreclosure

- Thus, when comparing [Bertrand vs. Cournot] or [$\theta \rightarrow 0$ vs. $\theta \rightarrow \infty$]:
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 - Variation in US competition:
 - US Bertrand vs. Cournot: Same relationship.
 - Dominating "replacement/pass-through" effect.
 - **Cost disadvantage of rivals $\bar{c} > 0$: Only level effects!**
 - **Opposite relationship!**
-

Summary: Incentives to Foreclose

1. Focus on *levels* of pre-merger margins misleading
 - Ignores role of price impact ("pass-through")
 - Maybe high precisely when US margin high and DS margin low
 2. No robust relationship between margins and incentives
 - Only when one asks: Why are margins high/low in the first place?
-

Direct vs. Indirect Constraints

- Recall: We use here standard "two-stage Cournot" setting. And:
 - Constant marginal cost of production US and DS.
 - US: $M > 2$ suppliers compete.
 - Focus on merchant market: Quantity \bar{q} and price \bar{p} .
-

Questions

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 - Direct: Through supplies to the merchant market.
 - Indirect: Through vertically integrated firm's DS operations.
 - **Assessing market power on the wholesale/merchant market:**
 - **Market definition and market share analysis.**
 - **Use of other "readily available" information.**
-

Strength of Indirect Constraints

- Hypothetical exercise: Compare outcomes on merchant market
 - Quantity \bar{q} and price \bar{p}
 - before vertical integration;
 - after vertical integration.
 - Differences? After $n = m = 1$ integration with only "captive sales"
 - weaker direct constraints ($M \rightarrow M - 1$);
 - additional indirect constraints.
-

Formal Trade-Off

- With homogeneous goods (and upstream conjectural variations):

$$L_{VI} := \frac{\bar{p}_{VI} - \bar{c}}{\bar{p}_{VI}} = \left(\frac{1}{M-1} \right) \left(\frac{1}{\bar{\varepsilon}_{VI}} \right) (1 + \lambda)$$

compared to

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- **Why does VI increase elasticity?**
 -> **"Responsiveness" $|d\bar{q}/d\bar{p}|$ larger as VI firm not affected.**

Linear Demand

Indirect constraints are "strong" (lower \bar{q}) if

- Downstream products are relatively undifferentiated -> High competition!
(Schneider / Legrand ?)
 - Upstream competition is weak.
-

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 - **strong indirect constraints (e.g., low differentiation parameter),**
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 - strong indirect constraints (e.g., low differentiation parameter),
 - or weak direct constraints (e.g., high conj. variations λ).
 - **In addition: Risk of "double counting".**
→ **Information on DS substitution already fully incorporates indirect constraints!**
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Further Insights from Formal Analysis (1)

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- Eg. (inverse) "dilution factor" $\delta = \bar{p}/p$.
Without VI, decomposition of elasticity

$$\varepsilon^{US} = \varepsilon^{DS} \cdot \delta \cdot \tau.$$

-> But this does NOT mean: Low δ -> Low ε^{US} -> High mark-up.

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- **Key: All parameters are exogenous.**

Simple example: Strong upstream competition generates low δ !

Summary: Direct vs. Indirect Constraints

1. Indirect constraints are not necessarily "weak".
 2. Indirect constraints are relatively stronger when, e.g.,
 - DS market is more competitive,
 - US market is less competitive.
 3. Can only advocate very cautious use of
 - inclusion of "captive sales";
 - use of other "readily available" information.
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Thank you!
