Analysis of Markets with Vertical Integration

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October 2008

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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").
  −> Irrelevance of "indirect constraints".

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- **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

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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- **Our approach:**

  - **Simple two-stage price competition: No conceptual problems.**

  - **Differentiated upstream products (akin to demand theory)**

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- "Standard" quantity competition approach overstates incentives to foreclose
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- **Corollary: Price vs. quantity competition upstream**

  – **Price competition −> Lower US, higher DS margin.**

  – **But: Less incentives to foreclose.**

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- **Trade-off! With linear demand second effect stronger**
  −> Higher US / lower DS margins imply higher incentives to foreclose

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  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?**

Production

- $m \in M = \{1, ..., M\}$ different inputs; $n \in N := \{1, ..., N\}$ final goods.

- Simplification: One-to-one production
  -> Good n: $q_n := \sum_{m \in M} q_n^m$
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- **Cost of production for n:**

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

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

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

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For meaningful comparative analysis in N (number of products):

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- **We obtain with $\overline{p}_\varnothing := \sum_{m \in M} p^m / M$ and $\widehat{\delta} := \delta / K$**

$$C_k'(q_n) = \overline{p}_\varnothing + \beta + \widehat{\delta} \frac{N}{M} q_n.$$

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

$$C_k'(q_n) = \overline{p}_\varnothing' + \beta + \widehat{\delta} \frac{N}{M - 1} q_n.$$

General Procedure: Incentives to Foreclose

- Specification:

  – One DS firm owns $n = 1, ..., f$ products. (Here: capacity)

  – Input $m = 1$ provided strategically. Input $m = 2$ competitively.

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- **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?

Downstream Homogeneous Cournot

Obtain some general insights:

- No "full foreclosure" even as upstream margin goes to zero as

  - $c^{m=2} = \overline{c}$ becomes equal to $c^{m=1}$ (which is normalized to zero);

  - δ (differentiation) goes to zero.

- Role of "pass through" rate: High $->$ 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 $\theta \to 0$, then if**

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

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

Incentives for (Full) Foreclosure

- Thus, when comparing [Bertrand vs. Cournot] or [$\theta \to 0$ vs. $\theta \to \infty$]:
  As there is more DS competition, then
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  - **US Bertrand vs. Cournot: Same relationship.**
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- Variation in US competition:

  - US Bertrand vs. Cournot: Same relationship.
    $->$ Dominating "replacement/pass-through" effect.

  - **Cost disadvantage of rivals $\overline{c} > 0$: 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 $\overline{q}$ and price $\overline{p}$.

Questions

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- **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 $\overline{q}$ and price $\overline{p}$

  – before vertical integration;

  – after vertical integration.

- Differences? After $n = m = 1$ integration with only "captive sales"

  – weaker direct constraints $(M -> M - 1)$;

  – additional indirect constraints.

Formal Trade-Off

- With homogeneous goods (and upstream conjectural variations):

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

compared to

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

Linear Demand

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

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

- Upstream competition is weak.

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- **But not necessarily more informative**
  $\mathbf{-\!\!>}$ **E.g., low share of merging independent suppliers could mean**

  - **strong indirect constraints (e.g., low differentiation parameter),**

  - **or weak direct constraints (e.g., high conj. variations λ).**

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- **In addition: Risk of "double counting".**
  -> Information on DS substitution already fully incorporates indirect constraints!

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  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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3. **Results guide practitioners' thinking on the role of "indirect constraints".**

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Thank you!