Competition Policy - Spring 2005

Vertical Restraints

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Summary

• Introduction ➤
• Types of vertical restraints ➤
• Intra-brand competition: The problem of double marginalization ➤
• Intra-brand competition: Horizontal externality ➤
• Other reasons for vertical restraints ➤
• The commitment problem ➤
Vertical restraints (or agreements): clauses to control for the externalities arising between firms operating at successive stages of an industry.

Plan

1. Different types of vertical restraints.

2. Intra-brand competition:
   (a) Double marginalization.
   (b) Horizontal externalities.

3. Inter-brand competition.


5. Exclusive dealing and vertical foreclosure.
Types of vertical restraints

Different vertical restraints are used (according to observability, absence of arbitrage etc.):

1. Non-linear pricing:
   (a) Franchise fee (FF) contracts.
   (b) Quantity discounts.

2. Resale price maintenance (RPM).

3. Quantity fixing.

4. Exclusivity clauses:
   (a) Exclusive territories (ET).
   (b) Exclusive dealing (ED).
   (c) Selective distribution.
Intra-brand competition: The problem of double marginalization (1/6)

- First proposed by Spengler (1950) (but even Cournot 1838 had something like this).
- Consumer demand $q = a - p$, marginal cost of upstream firm $c$, $c < a$.
- Marginal cost of downstream firm $w$, the wholesale price.
Intra-brand competition: The problem of double marginalization (2/6)

Linear pricing

- *Upstream firm* sets $w$, and after observing it, *downstream firm* sets $p$.

- Solution to last stage

\[
\max_p \Pi_D = (p - w)(a - p)
\]

Thus:

\[
p = \frac{a + w}{2}; q = \frac{a - w}{2}; \Pi_D = \frac{(a - w)^2}{4}
\]

- Anticipating this, solution to first stage:

\[
\max_w \Pi_U = (w - c)\frac{a - w}{2}
\]

Thus:

\[
w = \frac{a + c}{2}
\]
Intra-brand competition: The problem of double marginalization (3/6)

• This implies that overall:

\[ p_{sep} = \frac{3a + c}{4}; \pi_{U}^{sep} = \frac{(a - c)^2}{8}; \pi_{D}^{sep} = \frac{(a - c)^2}{16} \]

\[ \pi_{U}^{sep} + \pi_{D}^{sep} = PS^{sep} = \frac{3(a - c)^2}{16} \]

Merger - Vertical Integration

\[ \max_p \pi_{VI} = (p - c)(a - p) \]

\[ p_{VI} = \frac{a + c}{2}; q_{VI} = \frac{a - c}{2}; PS^{VI} = \frac{(a - c)^2}{4} \]

Comparison

• \( p_{sep} > p_{VI} \) (since \( \frac{3a+c}{4} > \frac{a+c}{2} \), when \( a > c \)). So \( CS^{sep} < CS^{VI} \).

• \( PS^{sep} < PS^{VI} \) (since \( \frac{3(a-c)^2}{16} < \frac{(a-c)^2}{4} \)).

• Total welfare increases with VI.
Vertical restraints

If a vertical merger is not feasible (or very transaction-costly).

- **Resale price maintenance (RPM):**
  - Imposing \( p = p^{VI} = \frac{a+c}{2} \) maximizes \( PS \).
  - Then the firms bargain over \( w \) to distribute surplus \( PS \) (with \( w \in [c,p^{VI}] \)).
  - Identical outcome is achieved with forcing \( p \leq \overline{p} = p^{VI} \) (and again \( w \) determines surplus \( PS \) division).

- **Quantity fixing (QF) (mirror image):**
  - Imposing \( q = q^{VI} = \frac{a-c}{2} \) maximizes \( PS \).
  - Then the firms bargain over \( w \) to distribute surplus \( PS \) (with \( w \in [c,p^{VI}] \)).
  - Identical outcome is achieved with forcing \( q \leq \overline{q} = q^{VI} \) (\( w \) determines surplus \( PS \) division).
• **Franchise fee (FF):**
  
  • Nonlinear pricing. Downstream firm is charged: \( F + wq \), with \( w = c \).
  
  • Then downstream maximizes:
    \[
    \max_p \Pi_{D}^{FF} = (p - c)(a - p) - F
    \]
  
  • So that
    \[
    p^{ff} = \frac{a + c}{2}; q^{ff} = \frac{a - c}{2}
    \]
  and
    \[
    \Pi_{D}^{FF} = \frac{(a - c)^2}{4} - F; \Pi_{U}^{ff} = F
    \]
  
  • Then bargaining is done over \( F \).
Risk aversion (Rey-Tirole - AER 1986):

- Risk neutral manufacturer (upstream), risk averse retailer (downstream).
- Under demand uncertainty: $\pi^U_{RPM} > \pi^U_{FF}$ and $SW_{RPM} > SW_{FF}$.
- Under cost uncertainty: $\pi^U_{FF} > \pi^U_{RPM}$ and $SW_{FF} > SW_{RPM}$. 
Intra-brand competition: Horizontal externality

First proposed by Telser (1960):

- Good shopkeepers/advertising help to sell the brand, but not at that store.
- Free riding by other stores.
Intra-brand competition: Horizontal externality

(2/9)

- Model
  - Perceived quality: \( u = \bar{u} + e \), where \( e = e_1 + e_2 \).
  - Costs: \( C(q, e_i) = wq + me_i^2 / 2 \), with \( m > 1 \)
  - Demand: \( q = (v + e) - p \) (competition in prices avoids double marginalization).

Separation

- Equilibrium (downstream):
  \[ p_1 = p_2 = w; \text{ and } e_1 = e_2 = 0. \]

- Equilibrium (upstream): Anticipating \( p = w \)
  \[ \max_w \Pi_{sep}^U = (w - c)(v - w) \]
  Thus \( w = \frac{w + c}{2} \).

\[ PS^{sep} = \Pi_{sep}^U = \frac{(v - c)^2}{4}; CS^{sep} = \frac{(v - c)^2}{8}; W^{sep} = \frac{3(v - c)^2}{8} \]
Vertical integration

- Maximization:

\[
\max_{p, e_1, e_2} \Pi^{VI} = (p - c)(v + e_1 + e_2 - p) - \mu \frac{e_1^2}{2} - \mu \frac{e_2^2}{2}
\]

- Solving:

\[
\begin{align*}
\frac{\partial \Pi^{VI}}{\partial e_i} &= p - c - \mu e_i = 0 \\
\frac{\partial \Pi^{VI}}{\partial p} &= v + e_1 + e_2 - 2p + c = 0
\end{align*}
\]

- Equilibrium:

\[
\begin{align*}
e_1 &= e_2 = e^{VI} = \frac{v - c}{2(\mu - 1)}; \\
p^{VI} &= \frac{\mu(v + c) - 2c}{2(\mu - 1)}; \\
q^{VI} &= \frac{\mu(v - c)}{4(\mu - 1)}
\end{align*}
\]

\[
PS^{VI} = \Pi^{VI} = \frac{\mu(v - c)^2}{4(\mu - 1)}; \\
CS^{VI} = \frac{\mu^2(v - c)^2}{8(\mu - 1)^2}; \\
W^{VI} = \frac{\mu(3\mu - 2)(v - c)^2}{8(\mu - 1)^2}
\]

Welfare comparison

\[W^{sep} < W^{VI} \text{ since } \frac{3(v - c)^2}{8} < \frac{\mu(3\mu - 2)(v - c)^2}{8(\mu - 1)^2}\]
Vertical restraints. If a vertical merger is not feasible (or very transaction-costly).

- **Exclusive territories and franchise fee:**
  - Non-linear contract \( T = wq + F \), with \( w = c \).
  - Maximization (if perceived level of quality is still \( e = e_1 + e_2 \)):
    \[
    \max_{p, e_i} \prod_{ET}^{\pi} = (p_i - c) \left( \frac{v + e_1 + e_2 - p_i}{2} \right) - \frac{\mu e_i^2}{2} - F
    \]
    - Solving:
      \[
      \begin{align*}
      \frac{\partial \prod_{ET}^{\pi}}{\partial e_i} &= p_i - c - \mu e_i = 0 \\
      \frac{\partial \prod_{ET}^{\pi}}{\partial p_i} &= v + e_1 + e_2 - 2p_i + c = 0
      \end{align*}
      \]
  - For any \( e_i \) price \( p_i \) is as in first best. Effort is not first best, but it is closer.
  - Retailer maximization if perceived quality is \( e = e_i \):
    \[
    \max_{p, e_i} \prod_{ET}^{\pi} = (p_i - c) \left( \frac{v + e_i - p_i}{2} \right) - \frac{\mu e_i^2}{2} - F
    \]
    - Solving:
      \[
      \begin{align*}
      \frac{\partial \prod_{ET}^{\pi}}{\partial e_i} &= p_i - c - \mu e_i = 0 \\
      \frac{\partial \prod_{ET}^{\pi}}{\partial p_i} &= v + e_i - 2p_i + c = 0
      \end{align*}
      \]
  - Still not first best, as fixed/convex cost of quality spread over smaller market.
Intra-brand competition: Horizontal externality

- Resale price maintenance and franchise fee:
  - Forcing price to $p = p^{VI}$, and non-linear contract, $(w, F)$.
  - Maximization (if perceived level of quality is still $e = e_1 + e_2$):
    \[
    \max_{e_i} \Pi^{RPM} = (p^{VI} - w) \frac{(v + e_1 + e_2 - p^{VI})}{2} - \mu e_i^2 - F.
    \]
    - Solving: $\frac{\partial \Pi^{ER}}{\partial e_i} = \frac{p^{VI} - w}{2} - \mu e_i = 0$. $e_i = \frac{p^{VI} - w}{2\mu} = e^{VI} = \frac{v-c}{2(\mu-1)}$.
    - Thus, we must have $w < c$ as otherwise we cannot have $e^{VI}$ (each retailer takes into account its effect into its own profit):
      \[
      w^{RPM} = \frac{3\mu c - 2c - \mu v}{2(\mu - 1)} < c; F = \frac{\Pi^{VI}}{2 + (c-w)q^{VI}}.
      \]
Intra-brand competition: Horizontal externality

- Resale price maintenance and quantity forcing:
  - Forcing price to $p = p^{VI}$, and $q \geq q^{VI}$.
  - Maximization (if perceived level of quality is still $e = e_1 + e_2$):
    \[
    \max_{e_i} \Pi^{QF}_i = (p^{VI} - w)\left(\frac{v + e_1 + e_2 - p^{VI}}{2}\right) - \mu \frac{e_i^2}{2} - F
    \]
    subject to:
    \[
    \frac{(v + e_1 + e_2 - p^{VI})}{2} \geq q^{VI}
    \]
  - Solving is simply choosing:
    \[
    e_i = \frac{2q^{VI} + p^{VI} - v}{2} = e^{VI}.
    \]
  - This contract already achieves efficiency. Rent allocation with $w$ (zero profits under no bargaining power for retailer):
    \[
    (p^{VI} - \hat{w})\left(\frac{v + 2e^{VI} - p^{VI}}{2}\right) - \mu \frac{(e^{VI})^2}{2} = 0
    \]
  - Thus:
    \[
    \hat{w} = \frac{v + c}{2}.
    \]
Vertical integration can reduce welfare

- Example with two types of consumers, different willingness to pay for quality, no price discrimination.

- Vertical integration: oversupply of quality, *distortion* used to extract some rents from high quality types.

- Vertical integration between *competing integrated firms* does not harm welfare.
More general treatment:

1. Downstream firms compete in quantities: double marginalization → Prices too high.

2. Free-riding in services → Quality too low.

3. Free-riding in prices → Prices too low (from point of view of competitors).

4. Effect number 1 is stronger than number 3.
Endogenous number of retailers

- Under vertical integration fewer outlets than under free entry (since free entrants do not take into account externality on others).

- Welfare may go up or down:
  - Socially excessive entry is possible under free entry.
  - Socially too high prices (double marginalization).
  - Socially reduced variability under vertical integration.
Other reasons for vertical restraints

- Quality certification:
  - A good is “better” for being supplied in a certain retailer.
  - This certification is costly.
  - It would imply efficiency for RPM or ET.

- Exclusive contracts (exclusive dealing ED): it may be necessary if more than one producer benefits from investments of retailer.

- Long-term contracts with ET or ED may be necessary for avoiding hold-up effect for specific investment.
The commitment problem (1/2)

- An upstream firm has negotiated an optimal wholesale price $w$ with retailers.
- It can then renegotiate to give one of them an advantage and get extra rents.
- This limits market power and is generally good for welfare.
- Problem does not exist with monopolist retailer.
  - Competition for consumers thus better than for retailers.
- Anticipating commitment problem: vertical restraints and vertical mergers.
Vertical mergers

- By merging with one retailer - less incentive to renege.
- May lead to only one retailer or several if there are inferior substitutes.

Vertical restraints

- Exclusive territories:
  - Usual problem with monopoly pricing.
  - With competing upstream firm - worse than under vertical merger.
- Resale price maintenance: in Europe still legally enforceable for books and pharmaceuticals.
- Most-favored nation and Anti-discrimination laws:
  - In Europe enforceable - “transparent pricing.”
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