ECO 650: Firms' Strategies and Markets
Vertical Contracts and Integration (I)

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Introduction

- Retailers are intermediate between producers and consumers
  - Consumers are mainly price takers
  - But producers and retailers sign contracts (or bargain)
- Most common contracts
  - The simplest contract is a unit price
  - Any additional clause is called "vertical restraint" (These clauses can add up.)
    - Two-part tariff: (franchise fee)
    - Slotting allowances (introduction fees, pay-to-stay fees,...)
    - Resale price maintenance (

Introduction

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    - Two-part tariff: (franchise fee)
    - Slotting allowances (introduction fees, pay-to-stay fees,...)
    - Resale price maintenance (), price-floor, price-ceiling.
    - Exclusivity clauses (exclusive territories, single branding, selective distribution,...), Tying / bundling clause, Royalties,...
- Vertical integration and raising rival's costs.

The Double-marginalization

Assumptions: P and R are successives monopolies. P produces a good at a unit cost c. R can resell this good to consumers. $P(q)$ is consumer's inverse demand.

- Stage 1: P sets a wholesale unit price w.
- Stage 2: R orders a quantity q and then resells it at price $P(q)$ to consumer.

In stage 2, R maximizes its profit with respect to q:

$$\pi_R(q) = (P(q) - w)q$$

$$\texttt{FOC} \quad P(q) + qP'(q) = w = \tilde{w}(q)$$

The Double-marginalization

In stage 1, P maximizes its profit with respect to q:

$$\pi_P(q) = (\tilde{w}(q) - c)q$$

$$\texttt{FOC} \;\; \tilde{w}(q) + q\tilde{w}'(q) = c$$

$$\texttt{with} \;\; P(q) + qP'(q) = \tilde{w}(q)$$

Deriving $\tilde{w}(q)$ and simplifying the FOC :

$$\begin{aligned} P(q) + qP'(q) + q(2P'(q) + qP''(q)) &= c \\ P(q) + qP'(q) + q\underbrace{P'(q)(2 + \Gamma(q))}_{<0} &= c \end{aligned}$$

- $\Gamma(q) = \frac{qP''(q)}{P'(q)}$ is such that $0 > \Gamma(q) > -2$, SOC of a monopoly.
- Comparing this FOC with the FOC of a vertically integrated firm, we obtain $\tilde{q} < q^M \Rightarrow \tilde{P} > p^M$
- Successive monopolies do worse than a single monopoly!
- If R makes the contract offer $w = c$, no problem.

Two-part tariff contracts

- Stage 1: P sets a two-part tariff contract (w, F) in which w is the unit wholesale price and F the franchise fee.

Stage 2 (almost unchanged), R maximizes its profit with respect to q:

$$\pi_R(q) = (P(q) - w)q - F \Rightarrow P(q) + qP'(q) = \tilde{w}(q)$$

In Stage 1, P maximizes its profit with respect to q:

$$\pi_P(q) = (\tilde{w}(q) - c)q + F$$

$$\texttt{u.c.} \quad \pi_R(q) = (P(q) - \tilde{w}(q))q - F \geq 0$$

$$\texttt{with} \;\; P(q) + qP'(q) = \tilde{w}(q)$$

Binding the constraint, P now maximizes its profit with respect to q:

$$\pi_P(q) = (P(q) - c)q$$

- P sets $q = q^M$ and $\tilde{w}(q^M) = c$. The double-margin problem is solved.
- $F = (P(q^M) - c)q^M > 0$ is a franchise. If R makes the contract offer, it sets $(w, F) = (c, 0)$.

RPM contract

- Stage 1: P sets a RPM contract (w, P) in which w is the unit wholesale price and P the resale price.

The quantity is directly controlled by P through $P(q)$

$P(q)$ is such that q maximizes $(P(q) - c)q$, i.e. $P(q^M)$ and sets $w = P(q^M)$.

- A RPM is as efficient as two-part tariff to correct the double marginalization.

Why using such contracts?

- To better coordinate (pricing, provision of service,...) and thus improve the joint profit of the vertical structure
- However, some contracts may have anti-competitive effects
  - Exclusionary effects on the upstream and/or the downstream market (Barriers to entry, foreclosure...);
  - Softening of competition upstream and/or downstream;

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Pros and Cons of 2 vertical restraints

- Slotting allowances
  - Foros, Kind and Sand (2009)
  - Shaffer (1991)
- Resale price Maintenance
  - MacAfee and Schwartz (1994)

Slotting allowances

- Up-front payment from producer to retailer to allow for the listing of a new product.
- Slotting fees in the US (FTC Report, 2003):
  - Frequency: 50% to 90% of all new grocery products.
  - Amount: Important compared to the total cost of launching a new product BUT varies a lot from one producer to another.

Why using slotting fees?

- Efficiency in allocating scarce shelf space
  - Screening device.
  - Sharing of risk and compensation for extra cost associated to a new product launching.
  - Better coordination in the chain on the producer's promotion of the new product, **Foros et al (2009)**.
- Slotting fees relax downstream competition **Shaffer,1991**

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Slotting Fees and incentives to advertise

Foros, Kind & Sand (2009)

Assumptions

- P chooses an advertising service in quantity s that improves final demand $D(p,s)$.
- The cost of advertising $\varphi(s)$ is increasing in s.

The game:

1. P (or R) offers a two-part tariff contract (w,F). R (or P) accepts or rejects the contract.
2. Simultaneously, P chooses s and R chooses p.

Program of a vertically integrated firm : FOC :

$$\begin{aligned}(p-c)\frac{\partial D(p,s)}{\partial p}+D(p,s) &= 0\\ (p-c)\frac{\partial D(p,s)}{\partial s}-\frac{\partial \varphi(s)}{\partial s} &= 0\end{aligned}$$

The solution is (p^M, s^M).

In stage 2, retailer's and producer's FOCs are :

$$(p - w)\frac{\partial D(p,s)}{\partial p} + D(p,s) = 0$$
$$(w - c)\frac{\partial D(p,s)}{\partial s} - \frac{\partial \varphi(s)}{\partial s} = 0$$

$\Rightarrow (p(w), s(w))$

In stage 1, (w^*, F^*) is such that :

$$\max_w (p(w) - c)D(p(w), s(w)) - \varphi(s(w)) \Rightarrow w^* > c$$

Franchise fee vs Slotting Fee

- If P makes the offer, R pays a franchise fee $F^* = (p^* - w^*)D(p^*, s^*) > 0$;
- If R makes the offer, P pays a slotting fee $F^* = -(w^* - c)D(p^*, s^*) + \varphi(s^*) < 0$.

Double distortion $p^M > w^* > c$ implies:
1) Double margin $p^* > p^M$; 2) Underprovision of service $0 < s^* < s^M$.

To restore efficiency R or P offers a three-part tariff (w, F, θ) with θ a revenue sharing rule (royalty).

$$
\begin{aligned}
(\theta p - w)\frac{\partial D(p,s)}{\partial p} + \theta D(p,s) &= 0 \\
((1-\theta)p + w - c)\frac{\partial D(p,s)}{\partial s} - \frac{\partial \varphi(s)}{\partial s} &= 0
\end{aligned}
$$

In stage 1, $(\hat{w}, \hat{F}, \hat{\theta})$ is such that $\hat{w} = \theta c$: Then it is immediate that for any $\theta > 0$ $p = p^M$ and, when $\hat{\theta} \to \epsilon$, $s \to s^M$.

Franchise fee vs Slotting Fee

- If P makes the offer, R pays a franchise fee: $\hat{F} \to (\hat{\theta} p^M - \hat{w}) D(p^M, s^M) > 0$ (close to 0);
- If R makes the offer, P pays a slotting fee: $\hat{F} \to -((1-\hat{\theta})p^M + \hat{w} - c) D(p^M, s^M) + \varphi(s^M) < 0$.

Efficiency is restored!

PROs of Slotting Fees

- When R is powerful, a slotting fee enables the retailer to make the producer the residual claimant $\Leftrightarrow$ similar to a franchise when the producer is powerful.
- The producer then chooses the wolesale price and the level of service that maximizes the industry profit
- The producer tranfers its whole profit to the retailer through the slotting fee payment.

CONs of Slotting Fees

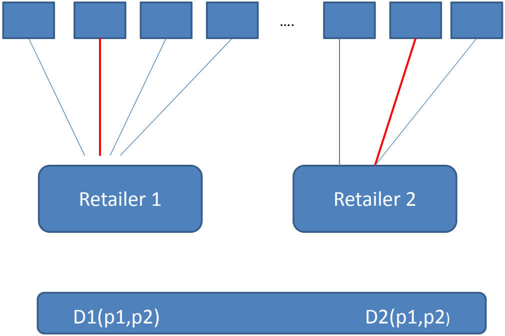
The next paper present a potential anticompetitive effect.

Slotting allowances: Anti-competitive effect

Shaffer (1991)

- Upstream perfect competition (unit production cost: c)
- Imperfect downstream competition

Small producers vs big retailers



Assumptions

- $\partial_{p_i} D_i < 0$ and $\partial_{p_j} D_i > 0$ and $|\partial_{p_i} D_i| > \partial_{p_j} D_i$: Products at each store are imperfect substitutes.
- Let $p = (p_1, p_2)$ define the vector of retail prices.
- Let w_i be the unit wholesale price and F_i the fixed fee specified in the contract with retailer i's supplier.
- Let $\pi_i(p, F_i) = (p_i - w_i)D_i(p) - F_i$ denote retailer i's profit.
  - If $\Delta = \partial^2_{p_i}\pi_i \partial^2_{p_j}\pi_j - \partial_{p_i}\partial_{p_j}\pi_i \partial_{p_j}\partial_{p_i}\pi_j$, we need $\Delta > \partial_{p_j} D_i \partial_{p_j}\partial_{p_i}\pi_j$ to ensure that there exists a unique Nash equilibrium and that each retailer's equilibrium profit, absent fixed fee, decreases in its wholesale price.
  - $\partial^2_{p_i}\pi_i < 0$ and $\partial_{p_i}\partial_{p_j}\pi_i > 0$: a firm's marginal profit increases with its rival price $\Rightarrow$ Bertrand reaction functions slope upward.

The Game

3-stage game

1. Producers simultaneously announce the terms of their sales contracts (w_i, F_i)
2. Retailers then choose which producer to buy from.
3. Retailers compete in price.

All information is common knowledge!

The retailer is legally prohibited from accepting slotting allowances but then not stocking producer's good!

No slotting allowances: $F_i = 0$

- The first order conditions in stage 3 for $i = 1, 2$ are:

$$\partial_{p_i}\pi_i = (p_i - w_i)\partial_{p_i} D_i + D_i = 0$$

- It defines a unique equilibrium in prices $(p_1^*(w_1, w_2), p_2^*(w_1, w_2))$
- In the first two-stages, to obtain shelf space at store i, a producer
  - Chooses the contract maximizing the retailer's profit:

$$\max_{w_i}(p_i^* - w_i)D_i(p_i^*, p_j^*)$$

  - Under its participation constraint:

$$(w_i - c)D_i(p_i^*, p_j^*) \geq 0$$

$$-D_i + \frac{\partial p_i^*}{\partial w_i}\underbrace{((p_i^* - w_i)\partial_{p_i} D_i + D_i)}_{=0} + \underbrace{(p_i - w_i)\underbrace{\partial_{p_j} D_i}_{<|\partial_{p_i} D_i|}\underbrace{\frac{\partial p_j^*}{\partial w_i}}_{<1}}_{<D_i} < 0$$

Equilibrium:

In equilibrium, all suppliers offer $w_i = c$ and retail prices are $p_1^*(c, c) = p_2^*(c, c) = p^b$.

Slotting allowances

- There is no restriction on the sign of fixed fees.
- Exactly as in the previous case, the FOCs in stage 3 for $i = 1, 2$ are:

$$\partial_{p_i}\pi_i = (p_i - w_i)\partial_{p_i} D_i + D_i = 0$$

- It defines a unique equilibrium in prices $(p_1^*(w_1, w_2), p_2^*(w_1, w_2))$
- In the first two-stages, to obtain shelf space at store i, a producer.
  - Chooses the contract maximizing retailer's profit:

$$\max_{w_i, F_i} (p_i^* - w_i) D_i(p_i^*, p_j^*) - F_i$$

  - Under its participation constraint:

$$(w_i - c) D_i(p_i^*, p_j^*) + F_i \geq 0$$

Slotting allowance: $F_i < 0$

- Binding the participation constraint $F_i = -(w_i - c)D_i(p_i^*, p_j^*)$ and replacing in the maximization program: $\max_{w_i}(p_i^* - c)D_i(p_i^*, p_j^*)$
- The FOC rewrites as:

$$[(p_i^* - c)\partial_{p_i} D_i(p_i^*, p_j^*) + D_i(p_i^*, p_j^*)]\frac{\partial p_i^*}{\partial w_i} + (p_i^* - c)\partial_{p_j} D_i(p_i^*, p_j^*)\frac{\partial p_j^*}{\partial w_i} = 0$$

- and thus (using retailer's FOC) simplifies as:

$$[(w_i - c)\partial_{p_i} D_i(p_i^*, p_j^*)]\frac{\partial p_i^*}{\partial w_i} + (p_i^* - c)\partial_{p_j} D_i(p_i^*, p_j^*)\frac{\partial p_j^*}{\partial w_i} = 0$$

- By assumption $\partial_{p_i} D_i < 0$ and $\partial_{p_j} D_i > 0$: products are imperfect substitutes.
- By totally differentiating stage-3 retailer FOC, we have BOUTON: $\frac{\partial p_i^*}{\partial w_i} = \frac{\partial_{p_i} D_i \partial^2_{p_j} \pi_j}{\Delta} > 0$ and $\frac{\partial p_j^*}{\partial w_i} = -\frac{\partial_{p_i} D_i \partial_{p_j} \partial_{p_i} \pi_j}{\Delta} > 0$

Result

The equilibrium supplier contract is $w_i = w^S > c$ and $F_i = F^S < 0$ and the resulting retail prices are $p_i^*(w^S, w^S) = p^S > p^b$.

Insights

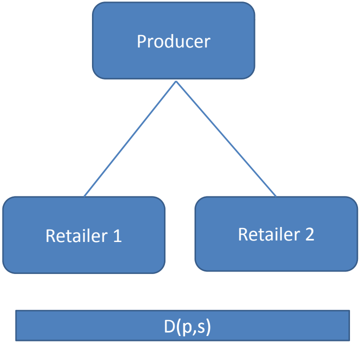
Shaffer (1991)

- By committing to $w_i > c$, retailer i gives retailer j an incentive to raise its price $\Rightarrow$ profitable for i
- The lost revenue from each sale is returned ex ante through the slotting allowance: $F_i < 0$
- Retailer j has similar incentives and thus both commit to $w^S > c$.
- Producers have no profit. Retail prices and profit are higher when producers can use slotting allowances to obtain shelf space.
- This result depends critically on contracts observability.
- Slotting allowances are legal and widespread. Here, Shaffer shows that even perfectly competitive producers can use them to relax retail competition to the detriment of consumers.

Resale Price Maintenance

- Legislation: prohibited in EU, and also in the US until the Leegin case (2007)
  - Leather products of high quality : sales service important
  - Since 2007, the US apply a rule of reason.
- In France (Lang Law 1981) or Spain since 1974, Germany since 2002 and Italy since 2005 Lang Law!
- RPM Pros
  - Solves double marginalization;
  - Enhances the level of service provided to consumers (correct the free-riding).
- RPM Cons
  - RPM destroys retail competition.
  - Reduces upstream competition.

Resale Price Maintenance



- With **public** contracts, a RPM is not necessary to restore p^M
  - Bertrand competition restores the efficient outcome $w = p$: Zero margin downstream, no double marginalization ($w = p^M$)
  - Imperfect / Cournot competition– a simple two-part tariff restore p^M.
- With retail services: A RPM eliminates horizontal externality (free-riding)

RPM to eliminate free-riding

Assumptions

- P offers a good produced at a unit cost c to two competing retailers $i = \{1, 2\}$ who compete à la Bertrand.
- Demand for the good is linear $D(p, s) = v + s - p$.
- Total effort service is the sum of the retailer's effort $s_1 + s_2 = s$
- Cost of effort is $c(s_i) = s_i^2$

RPM to eliminate free-riding

- What are the choices (p^M, s_i^M) of a fully vertically integrated structure?
  - The integrated structure maximizes the profit

$$\underset{p,s_1,s_2}{Max}(p-c)(v+s_1+s_2-p)-s_1^2-s_2^2$$

with respect to p, s_1 and s_2.

RPM to eliminate free-riding

- What are the choices (p^M, s_i^M) of a fully vertically integrated structure?
  - The integrated structure maximizes the profit

    $$\underset{p,s_1,s_2}{Max}(p-c)(v+s_1+s_2-p)-s_1^2-s_2^2$$

    with respect to p, s_1 and s_2.
  - We obtain $p^M = v$, $s_1^M = s_2^M = \frac{v-c}{2}$
- P and the two retailers are separated. What happens if P offers a simple uniform unit wholesale price contract w?
  - Bertrand competition $p = w$, $s_1 = s_2 = 0$ and, so $s = 0$ and $w = \frac{v+c}{2}$. A shop refrains from providing services that are not appropriable.
  - This leads to a suboptimal level of effort and a suboptimal global demand.

- P offers a contract (w, F, p) i.e. a contract with two-part tariff and resale price maintenance.
  - RPM + two-part tariff can reach the first best!
  - The retailer 1 chooses its effort level s_1 to maximize:

$$\underset{s_1}{Max}(p-w)\frac{(v+s_1+s_2-p)}{2}-s_1^2$$

  - We obtain $s_i^* = \frac{p-w}{4}$. P controls everything and therefore chooses $p = p^M = v$ and sets $(p^M - w)$ such that $s_i^* = s_i^M$ which implies that

$$\frac{v-w}{4} = s_i^M = \frac{v-c}{2}$$

    Therefore, $w^* = -v + 2c < c$ and $F_i = (p^M - w^*)\frac{(v+s_1^M+s_2^M-p^M)}{2} - (s_i^M)^2 = \frac{3}{4}(v-c)^2$.
  - $w = -v + 2c < c$, $p = p^M = v$ and $F_i = \frac{3}{4}(v-c)^2$ to get back the industry profit, $\Pi^M = \frac{(v-c)^2}{2}$.
  - $s_1 = s_2 = s^M \Rightarrow$ horizontal externality solved!.

RPM Anticompetitive effect

Mc Afee and Schwartz (1994)

Assumptions

- P sells a product to two Cournot-competing retailers $i = 1, 2$ each selling a quantity q_i. The equilibrium price is $P(q_1 + q_2)$.
- Similar with imperfect price competition.

3 stage game

1. P offers **public** contracts (F_i, w_i) to each retailer i.
2. If i accepts the contract, F_i is paid. Acceptance and reject decisions are observed by all.
3. Each i chooses q_i.

Public contracts

- P sets $w^* > c$, $q^* = q_i(w^*, w^*) = \frac{q^M}{2}$, $\Pi^P = \Pi^M$ and $F_i = \frac{\Pi^M}{2}$.

Public contract

With public contracts, the monopolist producer can always obtain the monopoly profit (despite downstream competition).

Public contracts

Solution of each stage.

- Stage 3: If $i = 1, 2$ accepted their contracts, each i sets q_i to maximise $(P(q_i, q_j) - w_i)q_i$ which gives $q_i(w_i, w_j)$.
- Stage 2: Let $P(w_i, w_j) = P(q_i(w_i, w_j), q_j(w_i, w_j))$; Each i accepts the contract (w_i, F_i) iff $(P(w_i, w_j)) - w_i)q_i(w_i, w_j) - F_i \geq 0$
- Stage 1: P chooses $w_1 = w_2 = w^*$ to maximize: $(P(w_i, w_j) - c)(q_i(w_i, w_j) + q_j(w_j, w_i))$, i.e. w^* is set at the level such that each firm produces half of the monopoly quantity and the manufacturer obtains the monopoly profit.

Secret contract and Opportunism

Consider now that in stage 1, P offers **secret** contracts (w_i, F_i) to each retailer i.

Secret contracts

With secret two-part tariffs offers, the monopoly outcome may no longer be supported in equilibrium.

The equilibrium depends on the retailer's beliefs about its rival's contract.

- Under *symmetric beliefs*, each retailer believes that the other receives the same offer as it receives; The monopoly outcome is sustained.
- Under *passive beliefs*, a retailer that receives an unexpected offer does not revise its belief about the offer made to its rival. Under passive beliefs, a contract must be pairwise-proof!

Secret Contracts and Passive Beliefs

Assumptions

- P sells a product to two Cournot-competing retailers $i = 1, 2$ each selling a quantity q_i. The equilibrium price is $P(q_1 + q_2)$.
- Similar with imperfect price competition.

3-stage game

1. P offers **secret** contracts (F_i, w_i) to each retailer i.
2. If i accepts the contract, F_i is paid. *Acceptance and reject decisions are not observed.*
3. Accepting firms i chooses q_i.

There is another variant with *interim observability*.

Secret Contracts

Solution of each stage

- Stage 3: If $i = 1, 2$ accepted their contracts, each i only sees its w_i and not the w_j of its rival. i has an anticipation $\hat{q}_j$ and sets q_i to maximise $(P(q_i, \hat{q}_j) - w_i)q_i$ which gives $q_i(w_i, \hat{q}_j)$ for $i = 1, 2$.
- Stage 2: Let $P(w_i, \hat{q}_j) = P(q_i(w_i, \hat{q}_j), \hat{q}_j)$; Each i accepts the contract (w_i, F_i) offered by P in stage 1 iff $(P(w_i, \hat{q}_j) - w_i)q_i(w_i, \hat{q}_j) - F_i \geq 0$.
- Stage 1: P sets

$$F_i = (P(w_i, \hat{q}_j) - w_i)q_i(w_i, \hat{q}_j)$$

and chooses w_i to maximize:

$$(P(w_i, \hat{q}_j) - c)q_i(w_i, \hat{q}_j) + \underbrace{(P(w_j, \hat{q}_i) - c)q_j(w_j, \hat{q}_i)}_{\texttt{independent of} w_i}$$

i.e. the joint profit of the pair $P - i$. $w_i^* = c$ and q_i^* is the Cournot quantity! Proof

- With secret contracts, opportunism prevents P from realizing the monopoly profit.
- Industry-wide Resale Price Maintenance may prevent opportunism and restore Monopoly profit!
- If P offers each retailer i an industry-wide RPM p^M and a wholesale price w_i with $F_i = (p^M - w_i)\frac{q^M}{2}$. Each retailer is protected against any deviation from the rival. Cite

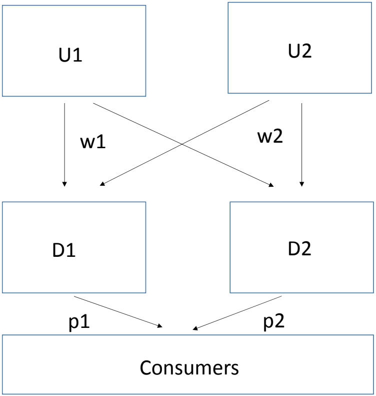
RPM

Industry-wide Resale Price Maintenance $\Rightarrow$ destroys downstream competition and restores the monopoly profit to the detriment of consumers (higher prices).

Vertical Integration and raising Rival's costs

- May improve the coordination issues within the vertical chain which can raise both the profit of the industry and consumer surplus;
- Partial vertical integration of a monopolist with a retailer may fail to solve the free riding on service and also have anticompetitive effects when contracts are secret (restore the monopoly power).
- Partial vertical integration may also trigger raising rival's cost strategy
  - Anti-competitive effects for the downstream rival
  - It may be detrimental to consumers.

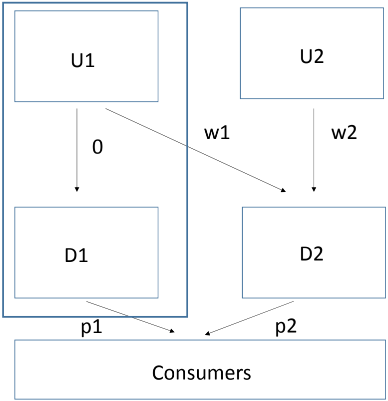
Equilibrium Vertical Foreclosure, OSS



Vertical separation

- Bertrand Competition upstream implies : w1=w2=0.
- At the downstream level, imperfect price competition p1*=p2*>0

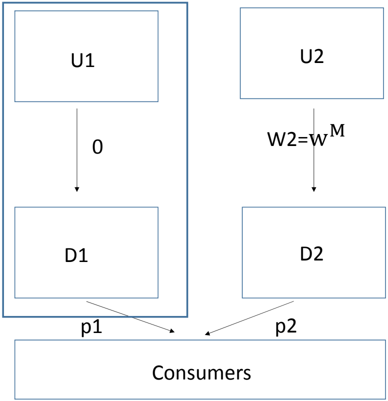
Equilibrium Vertical Foreclosure, OSS



Partial Vertical Integration

- U1-D1 integrated
- If U1-D1competes à la Bertrand on the upstream market with U2 w1=w2=0.
- At the downstream level, imperfect price competition p1*=p2*>0
- No strategic effect of vertical integration

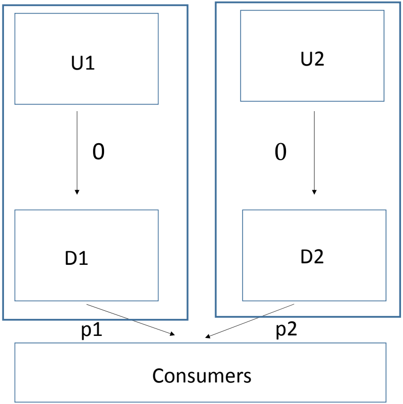
Equilibrium Vertical Foreclosure, OSS



Partial Vertical Integration

- U1-D1 integrated
- If U1-D1 stops serving D2. U2 sets the monopoly price: w2= w^M
- At the downstream level, asymmetric imperfect price competition 0<p1<p2
- $\pi_1(0, w^M) > \pi_1(0,0) > \pi_2(w^M, 0)$

Equilibrium Vertical Foreclosure, OSS



Backward Vertical Integration

- U2-D2 are now better off integrating
- $\pi_{U2}(w^M)+\pi_2(w^M,0) < 0 + \pi_2(0,0)$
- Each downstream firm supplies internally
- At the downstream level, asymmetric imperfect price competition p1*=p2*
- $\pi_1(0,0) = \pi_2(0,0)$

Equilibrium Vertical Foreclosure, OSS

- If $U1 - D1$ competes with $U2$ a la Bertrand, vertical integration is useless.
- If $U1 - D1$ stops entirely competing, then $U2$ and $D2$ integrate backward and vertical integration is useless!
- OSS show that there is an intermediate solution. The w set by $U1 - D1$ directly controls the price that the downstream rival pays, and the programme of the integrated firm becomes:

$$\underset{w}{Max} \pi_1(0, w)$$

$$\texttt{u.c} \;\; \pi_{U2}(w) + \pi_2(w, 0) \geq \pi_2(0, 0)$$

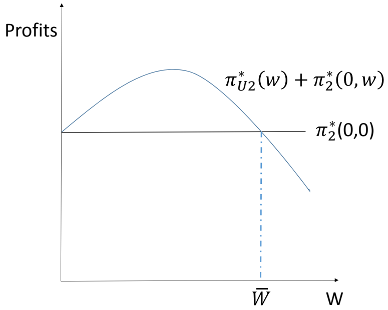
The solution is such that the constraint is just binding:

$$\pi_{U2}(w) + \pi_2(w, 0) = \pi_2(0, 0) \Rightarrow \bar{w}$$

We show that there exists $\bar{w} > 0$ such that $\pi_{U2}(\bar{w}) + \pi_2(\bar{w}, 0) > \pi_2(0, 0)$

$$\frac{\partial \pi^*_{U2}(w)}{\partial w}|_{w=0} = D_2(p^*_1, p^*_2) + \underbrace{w\frac{\partial D^*_2(w)}{\partial w}}_{0}$$

$$\frac{\partial \pi^*_2(w)}{\partial w}|_{w=0} = -D_2(p^*_1, p^*_2) + \underbrace{\frac{\partial \pi^*_2}{\partial p_1}\frac{\partial p^*_1}{\partial w}}_{>0} + \underbrace{\frac{\partial \pi^*_2}{\partial p_2}\frac{\partial p^*_2}{\partial w}}_{0}$$



Limits of this analysis

- Sensitive to the unit price contract assumption;
- The commitment issue!

Exercize: Competition between two vertical chains

Let us consider two vertical chains denoted 1 and 2. Each vertical chain is made of two firms, U_i which produces an input, and D_i who sells it to final consumers, with $i = 1, 2$.

- Production cost at each level are normalized to 0.
- Only D_i can sell the product made by U_i.
- Final goods are horizontally differentiated. p_1 (reps. p_2 denotes the final price of the good sold by chain 1 (resp. chain 2).

$$D_1 = 1 - p_1 + ap_2$$
$$D_2 = 1 - p_2 + ap_1$$

with $0 < a \leq 1$.

1. How to interpret a?

2. Vertical integration

   Assume first that U_i and D_i are merged to form a firm I_i who sells good i at price p_i to consumers. I_1 et I_2 compete and set their prices simultaneously.

   2.1. Consider that p_2 is given. Determine the profit of I_1 and the best reply $p_1^r(p_2)$ maximizing the profit of I_1 with p_2 given.

   2.2. Determine the best reply of firm I_2 for a given p_1, the Nash equilibrium prices p_1^{VI} et p_2^{VI} and profits of firms.

3. Vertical separation with two-part tariff. Assume now that each U_i et D_i are independent.
   - In stage 1: each U_i simultaneously offers a TIOLI two-part tariff contract (w_i, F_i) to their D_i. Each D_i can accept or reject the offer. Contract are observable by all.
   - In stage 2, D_1 and D_2 set simultaneously their final prices p_1 et p_2.

3.1. Stage 2, determine the profit of each D_i for a given (w_i, F_i). Compute the best reply of each firm D_i at a given p_j, $p_i^r(p_j)$. What is the effect of an increase in w_i on both best replies ? Comment.

3.3. Stage 1: Write the profit of U_i who anticipates final prices p_1^S et p_2^S. Determine F_i such that D_i accepts the contract.

3.4. Derive the profit of U_i as a function of w_i and sign it in $w_i = 0$. Does U_i sets $w_i > 0$? Explain.

3.5. Assume that, before the beginning of the game, firm U_i can choose whether or not to vertically integrate with D_i. What is its decision?

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Proof: Slotting allowances

Shaffer (1991)

back

$$
\begin{aligned}
(p_i - w_i)\partial_{p_i} D_i(p_i, p_j) + D_i(p_i, p_j) &= 0 && (1)\\
(p_j - w_j)\partial_{p_j} D_j(p_i, p_j) + D_j(p_i, p_j) &= 0 && (2)
\end{aligned}
$$

By applying implicit function theorem to stage-3 retailer FOC, we have:

$$
\begin{aligned}
\frac{\partial p_i}{\partial w_i} &= -\frac{-\partial_{p_i} D_i(p_i, p_j) + \partial_{p_i}\partial_{p_j}\pi_i(p_i, p_j)\frac{\partial p_j}{\partial w_i}}{\partial^2_{p_i}\pi_i(p_i, p_j)} && (3)\\
\frac{\partial p_j}{\partial w_i} &= -\frac{-\partial_{p_j}\partial_{p_i}\pi_j(p_i, p_j)\frac{\partial p_i}{\partial w_i}}{\partial^2_{p_j}\pi_j(p_i, p_j)} && (4)
\end{aligned}
$$

replacing (4) in (3), we obtain:

$$
\begin{aligned}
\frac{\partial p_i}{\partial w_i} &= \frac{\partial_{p_i} D_i(p_i, p_j)\partial^2_{p_j}\pi_j(p_i, p_j)}{\Delta} > 0 && (5)\\
\frac{\partial p_j}{\partial w_i} &= -\frac{\partial_{p_i} D_i(p_i, p_j)\partial_{p_j}\partial_{p_i}\pi_j(p_i, p_j)}{\Delta} > 0 && (6)
\end{aligned}
$$

Lang Law

Recommended price

1945

Fnac and Supermarkets use books as loss leaders: 20% price cuts

1974

1981

Law Lang : A unique price set by editors (Legal RPM)

Main Objectives:

- All consumers have equal access to books- a unique price other the whole national territory (no local monopoly)
- It preserves the density of bookstores and the quality of services, as small book stores can fight in service against large store.
- This enables bookstore to offer “selective books" and not only best sellers.

Main critics: “I fail to see how a regime that keeps book prices higher than they need to be promotes culture"
said Mario Monti in 2000 (European Commissionner for Competition)

back

In stage 3 q_i is such that $\frac{\partial P(q_i,\hat{q}_j)}{\partial q_i} + (P(q_i,\hat{q}_j) - w_i) = 0$ (FOC of the retailer). In stage 1, w_i is such that it maximizes $(P(w_i,\hat{q}_j) - c)q_i(w_i,\hat{q}_j)$ which rewrites as:

$$(\underbrace{\frac{\partial P(q_i,\hat{q}_j)}{\partial q_i} + (P(q_i,\hat{q}_j) - w_i)}_{=0} + (w_i - c))\frac{\partial q_i}{\partial w_i} = 0.$$

Using the FOC of the retailer, we obtain that: $w_i = c$. back

“The pressure of competition begins at the retail level. When retailers are very competitive, they make demands on their wholesalers and brokers for price relief, such as quantity trade discounts. The wholesalers and brokers, in an effort to protect their retail customers, plead with the manufacturer for a lower price. The manufacturer, in turn, strives to improve his efficiency to lower costs and thereby reduce his price."

“If the retail price is fixed, all prices down the line of distribution are stable and everyone is happy, except the consumer."

O’Brien and Shaffer (1992), “Vertical Control with Bilateral Contracts", The RAND Journal of Economics , Autumn, 1992, Vol. 23, No. 3, pp. 299-308. back