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Vertical Restraints

1. Franchise Fees (Legal status)

   - Two-part Tariff scheme
     - non linear pricing
     - fix fee
   - F could be negative, for example. Supermarkets charge firms a fix fee to sail their product.

     $$F + w \cdot q$$

2. Resale Price maintenance (RPM) (illegal per se)

   - restriction on the choice of final prices.
     - price ceiling $p \leq \bar{p}$
     - price floor $p \geq \underline{p}$
   - Quantity fixing
     - quantity forcing $q \geq \underline{q}$
     - quantity rationing $q \leq \bar{q}$

3. Exclusive Territories: divide market among retailers.(rule of reason)

4. Tie-in (illegal in principle, actual status :rule of reason)

   - Force D to buy other products by the same U

5. Excluding Dealing (rule of reason)

   - preventing a retailer from selling other products such as those of rival firms.

Example 1 *Vertical Externality : Double marginalization*

1D and 1 U

$D(p)$ and c

(VI) :$V(p) = (p - c)D(p)$:

monopoly price for a vertically integrated U-D firm is $p^M = \arg\max_r (r - c)D(r)$

let $q^M = D\left(p^M\right)$ be the associated monopoly quantity.

$$\xrightarrow{c} \text{U monopoly} \xrightarrow{w} \text{D monopoly} \xrightarrow{r} D(\cdot) \text{ demand}$$

Retailer's price : r , Wholesaler's price w

Retailer chooses r^* to maximize $(r - w) D(r)$ ($\rightarrow \pi^r(w)$)

$r(w) \in \arg\max_r (r - w)D(r)$ and the wholesaler chooses w to maximize $(w - c)\, r(w)$

Hence, $r(w) > p^M$ if $w > c$.

1. Franchise Fee (Legal status)
    - Two-part Tariff scheme $F + w \cdot q$

      U sets $w^* = c$ and $F^* = \pi^r(c)$ then D will chooses $q = q^M$

2. Resale Price maintenance (RPM) (per se illegal)
    - restriction on the choice of final prices.$\bar{p} = \underline{p}$

      U sets $r = p^M$ and chooses $w = p^M$

Example 2 *Downstream Moral Hazard :*

Demand for downstream firm is $D(p, s)$. The cost for provide service s by the retailer is $\phi(s)$. We assume $D_2 > 0, \phi'(s) > 0$ and $\phi''(s) < 0$.

(VI) :: $V(p, s) = (p - c - \phi(s))D(p, s)$

Lets focus on the interior solution

F.O.C. $p^M : V_1(p^M, s) = 0$

$$s^M : (p^M - c - \phi\left(s^M\right))D_2(p^M, s^M) = \phi'\left(s^M\right) D\left(p^M, s^M\right)$$

1. Franchise Fee (Legal status)

   - Two-part Tariff scheme $F + w \cdot q$

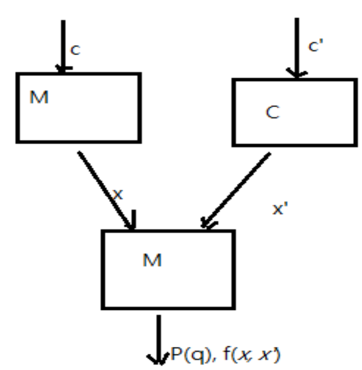
     U sets $w^* = c$ and $F^* = V_{p,s}^M V(p, s)$

2. Resale Price maintenance (RPM) (per se illegal)

   - U sets $r = p^M$ and chooses $w = p^M$
     - No incentive to provide service
   - $w > c$ leads to under provision of service.

If bilateral moral hazard exists, franchise fee may not work. The difficulty is that it is hard to simultaneously make both parties be residual claimants. The inverse demand function of the final goods market is $P(\cdot)$.

Example 3 *Input substitution: The production function of the downstream firm $q = f(x, x')$ is homogenous of degree 1.*



VI:

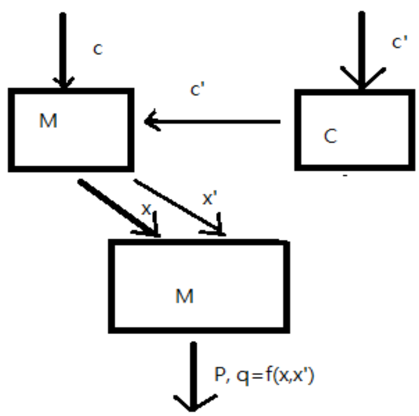
$$V^M = \max_{x,x'} P\left(f(x,x')\right) f\left(x,x'\right) - cx - c'x'$$

rate of substitute: RTS$=\dfrac{f_1}{f_2} = \dfrac{w}{c'} > \dfrac{c}{c'}$ if $w > c$

1. Franchise Fee

   - U sets $w^* = c$ and $F^* = V^M$

2. Tie in and Resale Price Maintenance



   - U produce both x and x' and set $\frac{w}{w'} = \frac{c}{c'}$
   - $r_{RPM} = p^M$
   - $wx^M + w'x'^M = p^M f\left(x^M, x'^M\right)$ extract all the profits from the retalor.

Example 4 *Deneckere, Marvel and Peck (AER 1997) Set price previously, then consumers choose q to clear the market. consumer's value is $v = 1$, $c = 0$*

state	1	2	3
probability	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
demand	1	2	3

U sets $w \longrightarrow$ D sets p and orders $q \rightarrow$ demand realized

Niche Competition Game:

$$w = 1 \;\Rightarrow\; q = 1 \;\Rightarrow\; \pi = 1$$
$$w = \tfrac{2}{3} \;\Rightarrow\; q = 2 \;\Rightarrow\; \pi = \tfrac{4}{3}$$
$$w = \tfrac{1}{3} \;\Rightarrow\; q = 3 \;\Rightarrow\; \pi = 1$$

Social welfare: $\frac{4}{3} + 1 \cdot \frac{1}{3} = \frac{5}{3}$

The RPM game: (sale is not allowed, i.e. price will not drop even if demand less than supply)

fix $p = 1$.

U sets $w, p \longrightarrow$ D orders $q \rightarrow$ demand realized

$$w = 1 \;\Rightarrow\; q = 1 \;\Rightarrow\; \pi = 1$$
$$w = \tfrac{5}{6} \;\Rightarrow\; q = 2 \;\Rightarrow\; \pi = \tfrac{5}{3}$$
$$w = \tfrac{2}{3} \;\Rightarrow\; q = 3 \;\Rightarrow\; \pi = 2$$

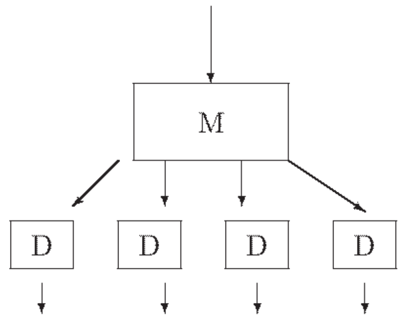
Social welfare:$2 + 0 = 2$

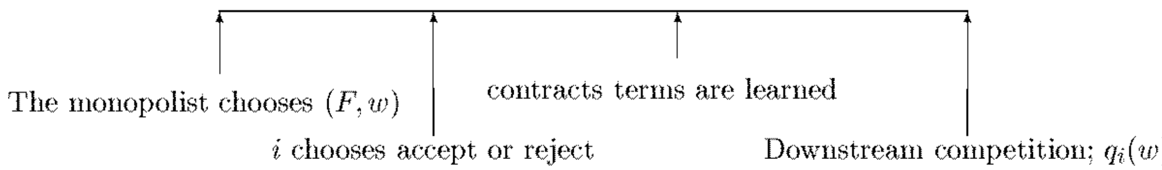
When retailers must commit to shipment quantities prior to resolution of demand uncertainty, manufacturer stipulation of a minimum retail price is likely to be profitable for the manufacturer, and not damaging to the retailers. The reason is simple: If demand turns out to be low, the unfettered market-clearing price can lie below the price that maximizes total sales revenue. A minimum retail price that is binding in the low demand state can thus increase total revenue even though it saddles retailers with unsold merchandise.

The upstream firm may sign a contract with a new downstream firm which will hurt the old contractors.

Example 5 *McAfee & Schwarz (AER 1994)*

–Nondiscrimination (most-favored-customer) clauses do not generally restore the commitment solution.





1. Benchmark: (Commitment Game)

$F = (F_1, \ldots, F_n)$, $w = (w_1, \ldots, n)$

If firm i accepts a contract (F_i, w_i), then he has to pay the monopolist $F_i + w_i q_i(w)$.

Downstream firm's profits:

Let $\pi_i(w)$ be i's gross profit function satisfying

$$\frac{\partial \pi_i(w)}{\partial w_i} < 0, \frac{\partial \pi_i(w)}{\partial w_j} > 0.$$

$q_i(w)$: input demand by i.

i accepts (F_i, w_i) if $\pi_i(w) \geq F_i$.

$$\Rightarrow F_i = \pi_i(w)$$

monopolist: $\max_w G(w) = \sum_{i=1}^{n}(w_i - c)q_i(w) + \sum_{i=1}^{n} \pi_i(w)$

$$\Rightarrow (w^*, G^*)$$

$$\text{F.O.C} \qquad \frac{\partial G(w_i, w_{-i}^*)}{\partial w_i}|_{w_i=w_i^*} = 0 \text{ for all } i$$

$$\frac{\partial G(w_{-n}^*, w_n)}{\partial w_n}|_{w_n=w_n^*} = 0$$

2. Problem: opportunism problem in a sequential game.

Make a take-it or leave-it offer sequentially at the first stage.

Suppose that all retailers $1, \ldots, n-1$ have accepted w_{-n}^*, $F_{-n}^* = \pi_{-n}(w^*)$

$$\max_{w_n} U_n(w) = \sum_{i=1}^{n-1}(w_i^* - c)q_i(w_n^*, w_n) + \sum_{i=1}^{n-1} F_i^* + (w_n - c)q_n(w_n^*, w_n) + \pi(w_{-n}^*, w_n)$$

$$\Rightarrow \max_{w_n} G(w) - \sum_{i \neq n} \pi_i(w) + \sum_{i=1}^{n-1} F_i^*$$

$$\text{F.O.C} \qquad \frac{\mathrm{d}U_n(w)}{\mathrm{d}w_n}|_{w_n=w_n^*} = \frac{\partial G}{\partial w_n} - \sum_{i \neq n} \frac{\pi_i}{\partial w_n}|_{w_n=w_n^*}$$

$$= 0 - (+) < 0$$

$$\Rightarrow w_n < w_n^*, G < G^*$$

3. Question: Will nondiscrimination clause be helpful?

Nondiscrimination game: Between stage 3 and 4, the wholesaler approaches each retailers in reverse order and makes all the accepted contracts in stage 1 available for exchanging.

Assumptions:

- (symmetry) $\pi_i(w_i, w_{-i}) = \pi(w_i, w_{-i})$ for $i = 1, \ldots, n$
- $\frac{\partial \pi_j^2}{\partial w_k \partial w_j} < 0$ for all $k \neq j$

$w_{-n} = w^*, F_{-n} = F^*, w_n < w^*, F_n > F^*$

If firm $i \neq n$ switches from (w^*, F^*) to (w_n, F_n), then

$$v(w_n, F_n) = \pi(w_n, w_n) - F_n = \pi(w_n, w_n) - \pi(w_n, w^*)$$

Don't change contract:

$$v^*(w^*, w_n) = \pi(w^*, w_n) - F^* = \pi(w^*, w_n) - \pi(w^*, w^*)$$

$$v - v^* = \int_{w_n}^{w^*} \int_{w_n}^{w^*} \frac{\partial^2 \pi}{\partial x \partial y}(x, y) \mathrm{d}x \mathrm{d}y < 0$$