

# Secret Contracting and Interlocking Relationships

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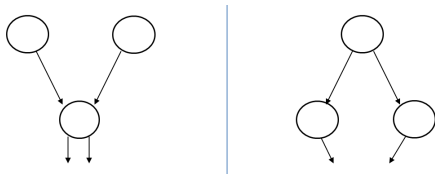
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# Vertical restraints : theory vs practice

- **Literature : mostly stylized market structures**

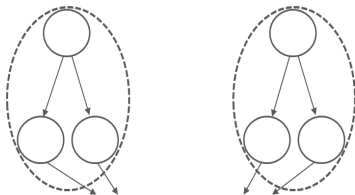
- **Monopoly**, either upstream or downstream (sometimes a competitive fringe)



focus on *vertical coordination*

- *Exclusion* : Bernheim and Whinston (*Rand* 1985, *Eca* 1986, *JPE* 1998), Marx and Shaffer (*Rand* 2007), Miklòs-Thal, Rey and Vergé (*JEEA* 2011), Rey and Whinston (*Rand* 2013)
- *Information* : Rey and Tirole (1986)
- *Opportunism* : O'Brien and Shaffer (*Rand* 1992), McAfee and Schwartz (*AER* 1994)
- *supply insurance* : Bolton and Whinston (*RES* 1993)
- ...

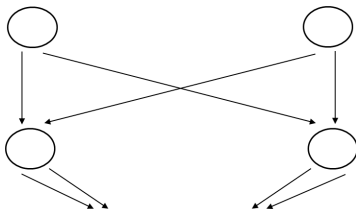
- **Literature : mostly stylized market structures (cont'd)**
  - **Competing vertical structures**



e.g., franchising : each manufacturer has its own retail network

- *Competition dampening (strategic delegation)* : Bonanno and Vickers (*JIE* 1988), Rey and Stiglitz (*EER* 1988, *Rand* 1995), Gal-Or (*EER* 1991)
- *Collusion* : Jullien and Rey (*Rand* 2007)
- ...

- In practice : multiple “interlocking” bilateral relations

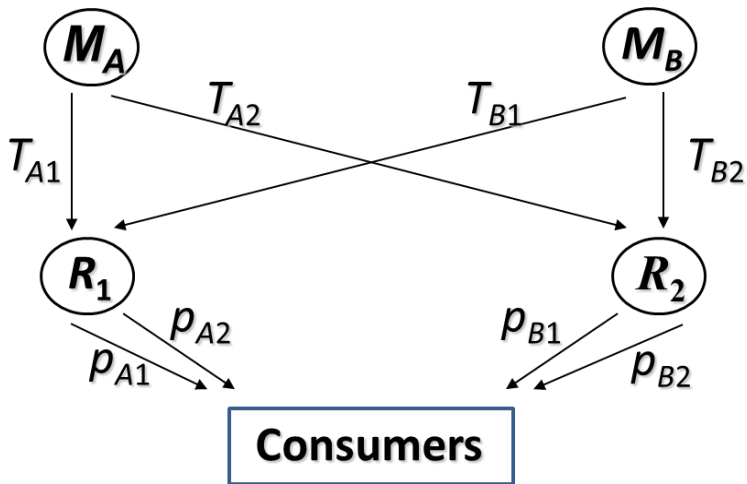


- **Competing firms often deal with the same competing suppliers**
  - Aircrafts (engines or components on various Boeing & Airbus planes), PCs (Intel & AMD on various manufacturers' models), etc.
  - Major brands are carried on by all (or most) supermarket chains (e.g., Evian & Perrier @ Carrefour & Auchan, Pepsi & Coke @ Walmart & Safeway)

- **Few papers with interlocking relationships, usually with some limitations**
  - **Linear tariffs** : Dobson and Waterson (*IJIO* 2007), Allain and Chambolle (*IJIO* 2011, although with an extension to two-part tariffs)
  - **Two-part tariffs** : **Rey and Vergé (JIE 2010)**
  - **Homogeneous input** : Hart and Tirole (*Brookings* 1990), de Fontenay and Gans (*Rand* 2005, *JIE* 2014), Nocke and White (*AER* 2007, *IJIO* 2010).
- **Nocke and Rey (2013)**
  - **Strategic interaction (imperfect competition) at both levels** : differentiated duopoly upstream, Cournot homogeneous duopoly downstream.
  - **General nonlinear tariffs, secret contracting (passive beliefs).**
  - **Exclusive dealing / vertical integration yields vertical foreclosure.**

# Interlocking relationships with public contracts

Rey and Vergé (*Journal of Industrial Economics*, 2010)



- **Intrinsic interlocking relationships**

- **All profits equal to 0 if one contract is rejected.**
- **Without RPM** : “competitive pricing”.
- **With RPM** : multiple equilibria, including one with cost-based tariffs and “monopoly” retail prices (i.e., industry profit is maximized).

- **These results remain valid as long as two conditions are satisfied :**

- ① Manufacturers can extract all profits.
- ② Manufacturers cannot exclude their rival from any retail location.

- **Retail bottlenecks :**

- **Without RPM** : non-existence problem.
- **With RPM** : potentially multiple equilibria, including one with **monopoly prices** (at least for a large range of parameter values in a setting with linear demands).

# Secret contracting with interlocking relationships

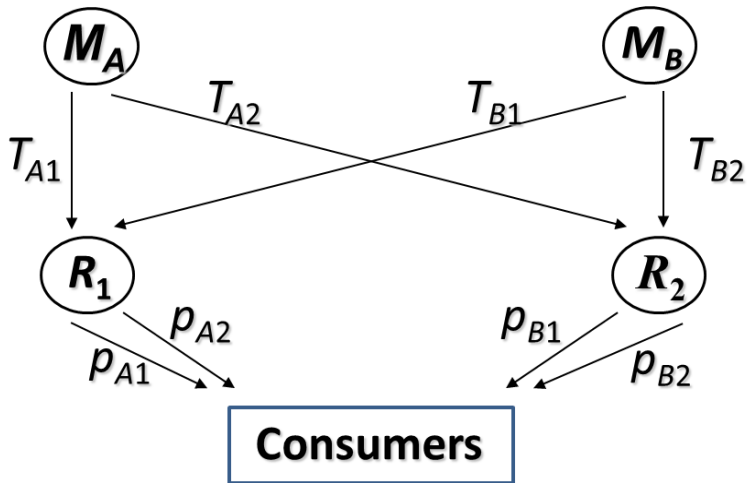
Main objectives – Work in progress

- **Objective 1 : Propose a tractable and flexible model of interlocking relationships**
  - Differentiated suppliers and differentiated retailers
  - Price competition
  - Balanced bargaining power in bilateral relations
  - Secret contracting
  - *General non-linear tariffs*
  - **Tractability : “contract equilibrium”**
- **Objective 2 : Use this setup to analyse the competitive effects of vertical restraints**
  - Resale Price Maintenance (minimum RPM, maximum RPM)
  - Price Parity Clauses, Most-favoured Nation Clauses
  - Dealership vs Agency
  - ... ?



# Secret contracting with interlocking relationships

## Setup



### • **Timing**

- ① Secret negotiations between each manufacturer and each retailer.
  - *Focus today : Two-part tariffs.*
- ② Price competition on the downstream market.

### • **Contract Equilibrium**

- **A set of bilateral contracts forms a contract equilibrium if there is no incentive for a manufacturer and a retailer to alter the terms of their contract.**
- First developed by Crémer and Riordan (*Rand* 1987), later used by O'Brien and Shaffer (*Rand* 1992) in a similar context but without inter-brand competition.

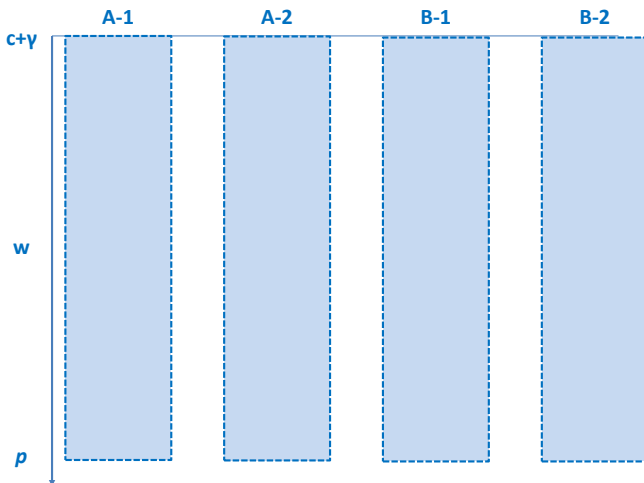
# Secret contracting with interlocking relationships

Unique outcome with two-part tariffs

- **With two-part tariffs**
  - **Equilibrium tariffs are cost-based (i.e.,  $w^* = c$ ).**
  - **Equilibrium retail price = equilibrium price in a multi-brand retailers' duopoly ( $A1 - B1$  vs.  $A2 - B2$ ).**
  - **Profits (i.e., fixed fees) uniquely defined : in each channel, manufacturers get more than “their share” of the per-channel profit.**

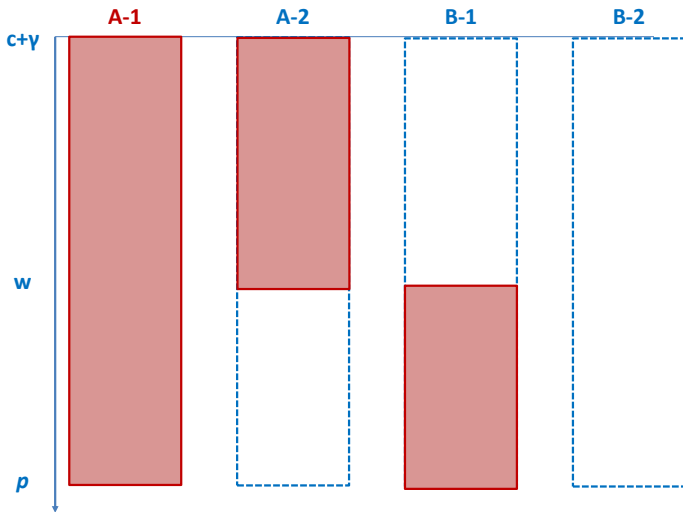
# Cost-based two-part tariffs in equilibrium

Industry profit maximization



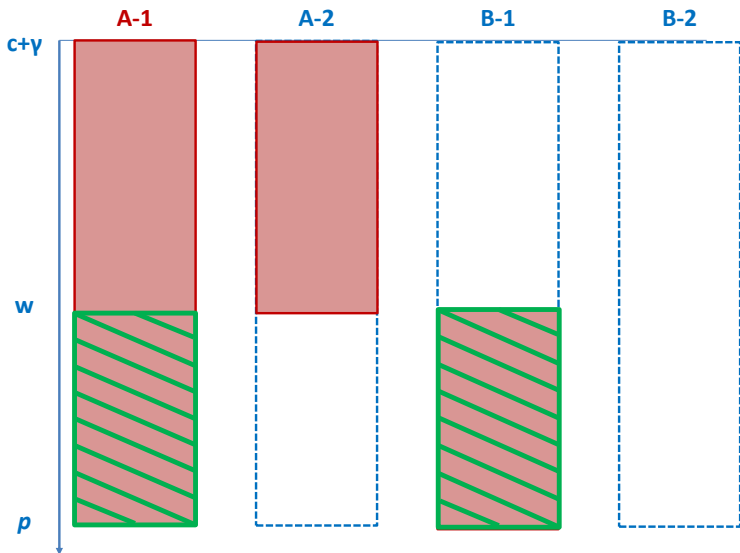
# Cost-based two-part tariffs in equilibrium

Joint profit of the pair  $M_A - R_1$



# Cost-based two-part tariffs in equilibrium

$R_1$ 's pricing decision based on ...



# Secret contracting with interlocking relationships

Endogenous market structure (with two-part tariffs)

- Introduce a preliminary stage in which **manufacturers and retailers simultaneously decide which channels they are willing to activate**, each firm having veto-power.
  - Look for Coalition-Proof Nash Equilibria (Bernheim, Peleg and Whinston, *JET* 1987).
- Contract equilibrium (for any market structure) with two-part tariffs :
  - Cost-based tariffs in equilibrium.
  - Individual profits are uniquely defined (when restricting attention to two part tariffs).

# Secret contracting with interlocking relationships

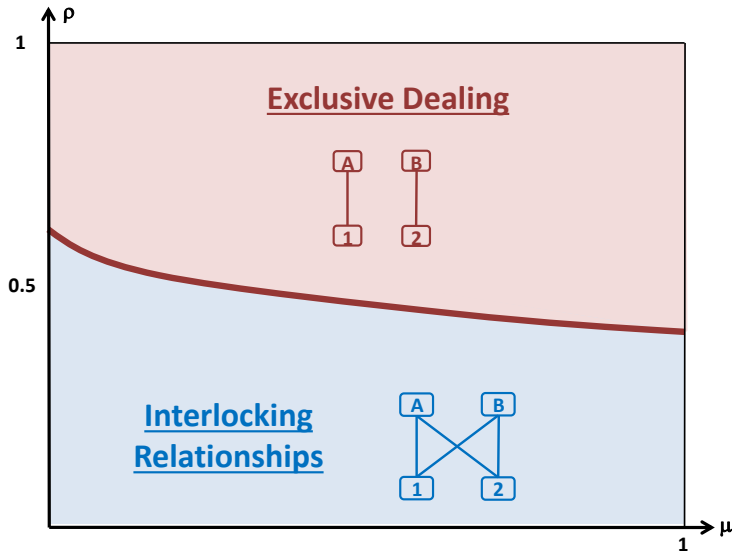
Endogenous market structure (with two-part tariffs)

- **At least two active channels in equilibrium.**
- **Upstream foreclosure (e.g.,  $A - 1/A - 2$ ) never a CPNE.**
  - Retailers prefer to deal with different manufacturers when they each carry one brand only.
- *To provide further results, we restrict attention to linear demands.*
  - $P_{ij}(q) = 1 - (q_{ij} + \mu q_{hj}) - \rho(q_{ik} + \mu q_{hk})$ .
- **Downstream foreclosure (e.g.,  $A - 1/B - 1$ ) is never a CPNE.**
  - Manufacturers prefer to deal with different retailers when they each deal with one retailer only.
- **Therefore there does not exist any CPNE where one firm is fully excluded.**
  - Exclusive dealing (e.g.,  $A - 1/B - 2$ ), Connected structures (3 active channels) or Interlocking relationships (all channels are active).



# Secret contracting with interlocking relationships

Endogenous market structure (with two-part tariffs)



# Secret contracting with Interlocking Relationships

## Resale Price Maintenance (fixed prices)

- Contract between  $M_i$  and  $R_j$  now specifies a wholesale two-part tariff ( $T_{ij}(q) = w_{ij}q + F_{ij}$ ) as well the retail price ( $p_{ij}$ ) charged to final consumers.
- Multiple equilibria :**
  - Equilibrium with same prices and quantities as without RPM (using cost-based tariffs) but where manufacturers (resp., retailers) get a higher (resp., lower) share of the profit than without RPM.
  - Any price vector satisfying the following conditions can be sustained in a contract equilibrium with RPM :**

$$\frac{\partial D_{A1}}{\partial p_{B1}} \frac{\partial D_{B2}}{\partial p_{A2}} \neq \frac{\partial D_{A1}}{\partial p_{A2}} \frac{\partial D_{B2}}{\partial p_{B1}} \quad \text{and} \quad \frac{\partial D_{A2}}{\partial p_{B2}} \frac{\partial D_{B1}}{\partial p_{A1}} \neq \frac{\partial D_{A2}}{\partial p_{A1}} \frac{\partial D_{B1}}{\partial p_{B2}}$$

- In the symmetric linear demand case, the conditions amount to  $\mu \neq \rho$ . Even when  $\mu = \rho$ , multiple (asymmetric) equilibria exist. .
- Intuition : The joint profit of the pair  $M_i - R_j$  does not depend on the wholesale price  $w_{ij}$ . However,  $w_{ij}$  affects the joint profits of  $M_i - R_k$  and  $M_h - R_j$ .

# Secret contracting with Interlocking Relationships

Resale Price Maintenance : Minimum or Maximum RPM ?

- Focus on symmetric demand functions and symmetric equilibria.
- The marginal impact of  $p_{ij}$  on  $R_i$ 's (retail) profit when it faces cost-based tariffs :

$$\begin{aligned}\mu(P) &= D(P) + (p - c - \gamma) \left( \frac{\partial D_{ij}}{\partial p_{ij}}(P) + \frac{\partial D_{hj}}{\partial p_{ij}}(P) \right) \\ &= D(P) - (p - c - \gamma) (\lambda(P) - \lambda_M(P))\end{aligned}$$

- The symmetric retail price  $p$  must maximize  $M_i$  and  $R_j$ 's joint profit with respect to  $p_{ij}$ , that is :

$$p = \arg \max_{p_{ij}} [(p_{ij} - c - \gamma) D_{ij} + (w - c) D_{ik} + (p - w - \gamma) D_{hj}]$$

$\Leftrightarrow$

$$(w - c) (\lambda_M(P) - \lambda_R(P)) = \mu(P) \quad \Leftrightarrow \quad w = c + \frac{\mu(P)}{\lambda_M(P) - \lambda_R(P)}$$

# Secret contracting with Interlocking Relationships

Resale Price Maintenance : Minimum or Maximum RPM ?

- By construction,  $\mu(P^*) = 0$ , with  $p^*$  denoting the equilibrium price without RPM. Moreover,  $\mu(P) < 0$  for  $p > p^*$  (under reasonable regularity conditions).
- Therefore to sustain higher prices than without RPM (i.e.,  $p > p^*$ ), wholesale margins need to be positive (resp., negative) when intra-brand competition is fiercer (resp., less intense) than inter-brand competition, i.e.,  $\lambda_R(P) > \lambda_M(P)$  (resp.,  $<$ ).
- Moreover, retailers have excessive incentives to increase prices when wholesale margins are positive. This is because they do not internalise manufacturer's wholesale margins and thus impose a negative externality on manufacturers in that case.
- Therefore, when intra-brand competition is fiercer than inter-brand competition, retailers have to be prevented from excessively raising prices. Maximum RPM is thus needed to achieve prices above  $p^*$ .

# Secret contracting with Interlocking Relationships

Resale Price Maintenance : Minimum or Maximum RPM ?

## Minimum or Maximum RPM ?

Restricting attention to symmetric equilibria

- **Minimum RPM can be anticompetitive if and only if there is more substitution between brands than between retailers.**
- **Maximum RPM can be anticompetitive if and only if there is more substitution between retailers' stores than between brands.**
- **Remark :** Moving from RPM (i.e., fixed price) to a price floor or a price ceiling may also affect the division of profit since  $R_j$ 's disagreement payoff may be affected.
- **To be done :** *Equilibrium selection - Endogenous choice of RPM / Endogenous market structure.*

# Secret contracting with Interlocking Relationships

Are Price Parity Agreements equivalent to RPM ?

- **Price Parity / Retail MFN** : Agreement between  $M_i$  and  $R_j$  requires that the retailer sets the same retail prices for the two brands it carries.
- In this setting, **price parity agreements are ineffective, i.e., the equilibrium outcome is the same as without vertical restraints.**
- Intuition very similar to the case without vertical restraints :
  - $R_j$  chooses  $p_j^R(w_{ij}, w_{hj})$  so as to maximize its retail profit (given  $p_k^*$ ) :

$$(p_j - w_{ij} - \gamma) D_{ij}(p_j, p_k^*) + (p_j - w_{hj} - \gamma) D_{hj}(p_j, p_k^*)$$

- Joint profit of the pair  $M_i - R_j$  is then :

$$(p_j^R(w_{ij}, w_{hj}^*) - c - \gamma) D_{ij}(p_j^R, p_k^*) + (w_{ik}^* - c) D_{ik}(p_j^R, p_k^*) \\ + (p_j^R(w_{ij}, w_{hj}^*) - w_{hj}^* - \gamma) D_{hj}(p_j^R, p_k^*)$$

- If  $w_{ik}^* = c$ , the two profits coincide when  $w_{ij} = c$ . Can then be shown that this equilibrium is unique (under reasonable conditions).

# Secret contracting with Interlocking Relationships

## Wholesale vs. Agency

- **Agency model** : the manufacturer always remains the owner of its goods and services, and chooses the prices at which it offers them to consumers. A retailer obtains a commission on the sales made through its platform.
- Timing is now as follows :
  - ① Each  $M_i - R_j$  pair negotiates a (possibly non-linear) commission schedule  $U_{ij}(q_{ij})$  based on the volume of sales  $q_{ij}$  achieved by  $M_i$  through  $R_j$ 's platform. As before, these bilateral negotiations are simultaneous and secret.
  - ② Each  $M_i$  sets the retail prices for its brand for each platform that carry the brand, i.e.,  $P_i = (p_{i1}, p_{i2})$ .
- **Same as wholesale model but “upside-down”** :
  - $R_j$  sells a “service” (production cost  $\gamma$ ) to  $M_i$  at price  $U_{ij}(q_{ij})$ .
  - $M_i$  uses the service to sell its product (additional marginal cost  $c$ ).

# Secret contracting with Interlocking Relationships

Wholesale vs. Agency

- **No vertical restraints  $\Leftrightarrow$  two-part commission schedules :**
  - **Cost-based commissions**, i.e.,  $U'_{ij} = \gamma$ .
  - **Retail prices as in a multi-location duopoly** (i.e.,  $A - 1/A - 2$  vs.  $B - 1/B - 2$ ).
  - Whether equilibrium final prices are higher in the wholesale or agency model depends on the relative degrees of substitution between manufacturers and between retailers (i.e.,  $\lambda_M \lesseqgtr \lambda_R$ ).
- **Price Parity Agreements (platform MFNs) have no impact.**
- What would be the equivalent to RPM? Retail prices negotiated between  $M_i$  and  $R_j$ . Thus, multiple equilibria.





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