Predatory accommodation in vertical contracting with externalities

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Introduction

- Predatory pricing may cause injury to competition (Robinson-Patman Act)
- However, Marx & Shaffer 1999 offer a contrasted view
- BCP without exclusion and may be welfare improving (predatory accommodation)
- Assumptions: sequential bargaining between 2 manufacturers and a common retailer, public contracts

Introduction 2

- Predatory accommodation: the first Manufacturer and the retailer jointly benefit from the presence of the second manufacturer
- Here, simultaneous bargaining with externalities between manufacturers (oligopsonistic interaction on an upstream input market)
- similar consequences: BMCP

Introduction 3

- Framework consistent with some stylized facts from Food Industry
- Literature on oligopsonistic interaction between processors (Chen & Lent (1992), Wann & Sexton (1992), Alston & alii (1997), Hamilton & Sunding (1998), Hamilton (2002))

Introduction 4

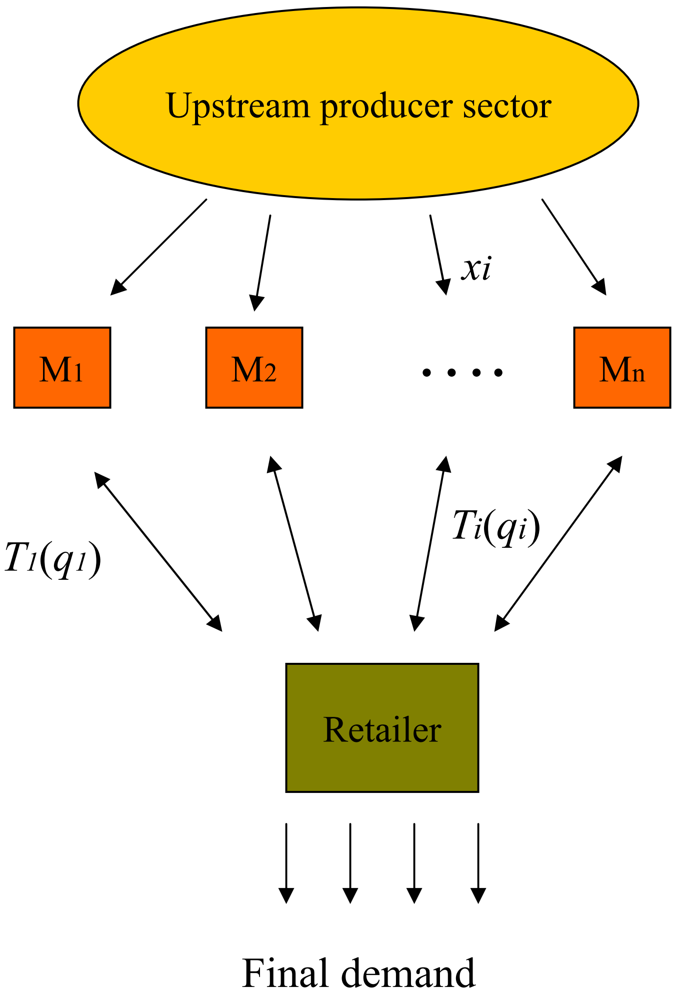
- This paper: introduces oligopoly interaction with an imperfectly competitive retail sector
- Extreme case: monopolist retailer
- Simultaneous bargaining game between n Manufacturers and a common retailer
- Extension of M&S in presence of externalities

The model

Competitive Agricultural Sector
Homogenous product

n Manufacturers
Oligopoly and oligopsony
Differentiated products

Retailer
Monopoly and monopsony



Inverse supply function

$$p_x = P_x(\sum_i x_i)$$

Processing Technology

$$q_i = f_i(x_i)$$

Inverse demand function

$$q_i = P_i(\mathbf{q})$$

Cost function

Oligopsonistic competition implies **negative cost externalities:**
$\partial C_i / \partial q_j > 0$
Procurement cost depends on the other manufacturers' purchases:

$$C_i(\mathbf{q}) = \left[P_x\left(\sum_i f_i^{-1}(q_i)\right) \right] f_i^{-1}(q_i)$$

Main assumptions

$A1$: $R(\mathbf{q})$ is continuous, twice differentiable and concave,

$A2$: $C_i(\mathbf{q})$ is continuous, twice differentiable and convex, $\forall i = 1, ..., n$,

$A3$: There are gains from trading all goods, i.e. $\exists \mathbf{q} \in \Re^n_+$ such that $R(\mathbf{q}) - \sum_i C_i(\mathbf{q}) > 0$

where $R(\mathbf{q})$ is the revenue function

$$R(\mathbf{q}) = \sum_i P_i(\mathbf{q}) q_i$$

Profits

- Manufacturer profits

$$\pi^i = T_i - C_i(\mathbf{q})$$

- Retailer profit

$$\pi^R = R(\mathbf{q}) - \sum_i T_i$$

Bargaining over contracts

- Timing:

1. Retailer negotiates a contract $T_i(q_i)$ with each M_i simultaneously
2. Manufacturers compete to buy the raw product and process the goods
3. The retailer resells the differentiated goods to final consumers

- Focus on equilibria where all products are sold

- Assumptions:

1. Bargaining between R and M_i maximizes joint profit, taking as given all other contracts
2. Each player earns its disagreement payoff plus a share of the incremental gain to trade (with proportion λ_i to M_i)

Simultaneous bargaining

- Multiple equilibria in contracts
- Restriction to two-parts tariffs

$$T_i(q_i) = \begin{cases} w_i q_i - F_i, & q_i > 0 \\ 0, & q_i = 0 \end{cases}, \forall i = 1...n$$

- Joint profit of M_i and R:

$$\Pi^i = \sum_i [P_i(\mathbf{q}) q_i] - C_i(\mathbf{q}) - \sum_{j \neq i} T_j$$

Simultaneous bargaining 2

- Retailing stage:

$$\mathbf{q}(\mathbf{w}) \in \arg\max_{q_1,\ldots,q_n} \pi^R = \sum_i [(P_i(\mathbf{q}) - w_i)q_i + F_i]$$

- Bargaining stage:

$$\max_{w_i} \Pi^i = P_i(\mathbf{q}(\mathbf{w}))q_i(\mathbf{w}) - C_i(\mathbf{q}(\mathbf{w})) + \sum_{j \neq i} [(P_j(\mathbf{q}(\mathbf{w})) - w_j)q_j(\mathbf{w}) + F_j]$$

Main results

Proposition 1 *In a simultaneous bilateral bargaining equilibrium with two-parts tariffs, wholesale prices are given implicitly by*

$$w_i - \frac{\partial C_i}{\partial q_i} = \sum_{j \neq i} \gamma_{ji} \frac{\partial C_i}{\partial q_j}, \qquad \forall i = 1, ..., n. \tag{5}$$

where $\gamma_{ji} = \frac{\partial q_j}{\partial w_i} / \frac{\partial q_i}{\partial w_i}$ *with* $\left|\gamma_{ji}\right| \in [0, 1]$. *Moreover, if products are imperfect substitutes (complements), then wholesale price is below (above) marginal cost* $(w_i - \frac{\partial C_i}{\partial q_i} < (>) 0, \forall i)$.

Main results 2

- Intuition: decreasing w_i amounts to decrease rivals' quantities and hence its own procurement cost
  « reducing its own cost » strategy
- Cost externalities irrelevant if independent demands
- More compelling when products are less differentiated
- Assuming symmetry, below average cost pricing (with substitutes) iff there is few differentiation

$$1+\sum_{j\neq i}\gamma_{ji}<0$$

Main results 3

Proposition 2 *In a simultaneous bilateral bargaining equilibrium with two-parts tariffs, joint profit of all manufacturers and the retailer is not maximized.*

- Optimal internal price for the integrated structure:

$$w_i = \sum_j \frac{\partial C_j}{\partial q_i}$$

Main results 4

Proposition 3 *In a simultaneous bilateral bargaining equilibrium with two-parts tariffs, the equilibrium payoff to manufacturer M_i, for any i, is:*

$$\pi^i = \lambda_i \left[\Pi - \Pi_{-i} - \Delta_{-i}\right]$$

Scale effect

Equilibrium joint profit without Mi

Equilibrium joint profit with Mi

while the equilibrium payoff to the retailer is:

$$\pi^R = \left(1 - \sum_i \lambda_i\right) \Pi + \sum_i \lambda_i \Pi_{-i} + \sum_i \lambda_i \Delta_{-i}$$

where $\Delta_{-i} = \sum_{j \neq i} \left[w_j q_j - C_j(\mathbf{q})\right] - \sum_{j \neq i} \left[w_j \hat{q}_j - C_j(\hat{\mathbf{q}}_{-i})\right]$.

Optimal fee

$$F_i = \left[w_i - \frac{C_i(\mathbf{q})}{q_i}\right] q_i - \lambda_i \left[\Pi - \Pi_{-i} - \Delta_{-i}\right]$$

- If the retailer has all the bargaining power (λ_i=0) and if w_i is between MC and AC, then F_i>0

Sequential Bargaining

- Extension of Marx and Shaffer (1999) to the presence of externalities
- 2 manufacturers negotiate sequentially with the retailer
- M_1 is the first to negotiate
- Proposition 1 obviously applies to M_2

$$w_2^* = \frac{\partial C_2}{\partial q_2} + \gamma_{12} \frac{\partial C_2}{\partial q_1}$$

Sequential bargaining 2

- Optimal contract for M_1:

Proposition 4 *At the equilibrium with sequential bilateral negotiations, the wholesale price for M_1 is given by:*

Internalization effect

Marx and Shaffer's rent shifting effect

$$w_1^* - \frac{\partial C_1}{\partial q_1} = (1-\lambda_2)(1-\eta)\frac{\partial C_2}{\partial q_1} + \gamma_{21}\frac{\partial C_1}{\partial q_2} - \frac{\lambda_2}{\frac{\partial q_1}{\partial w_1}}(q_1^* - \hat{q}_1) \qquad (13)$$

where $\gamma_{ji} = \frac{\partial q_j}{\partial w_i} / \frac{\partial q_i}{\partial w_i}$ *and* $\eta = \gamma_{21}\gamma_{12}$.

« Reducing its own cost » effect

Sequential bargaining 3

- M&S rent-shifting effect: non positive if substitutes $q_1^* < \hat{q}_1$

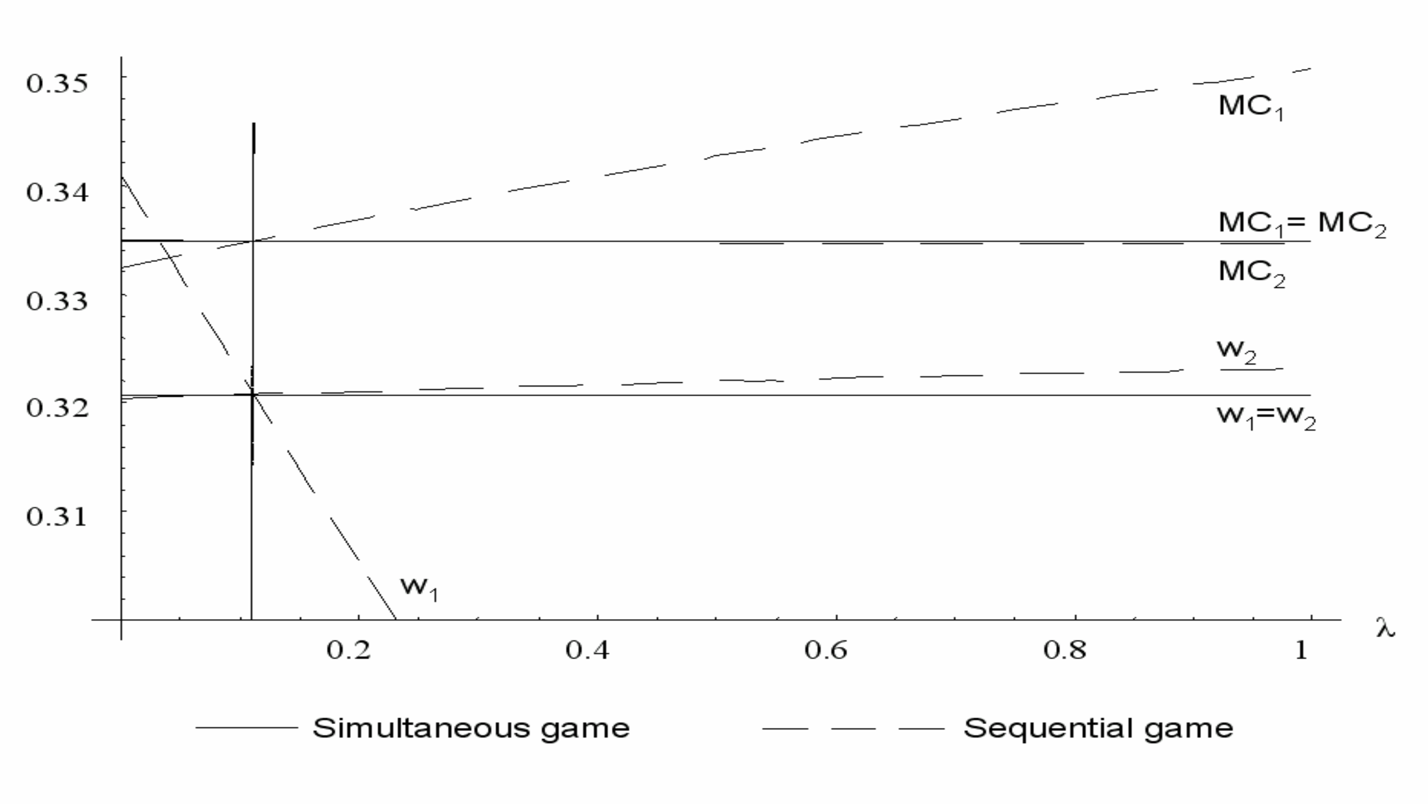
Increase in retailer disagreement payoff with M_2
But also increase joint profit with M_2 that weakens bargaining position of R
First effect dominates as long as $\lambda_2 > 0$
-> below marginal cost pricing

- Internalization effect is non negative -> above marginal cost pricing

Incentives to partially internalize the negative externality of q_1 on C_2

- Two effects towards BMCP
- One effect towards AMCP

Wholesale pricing



For M_1, for low λ internalization effect overcomes the two other effects (rent-shifting and cost reduction)

For high values, the rent shifting effect becomes dominant and BMCP appears

Surplus analysis

- Simultaneous bargaining

BMCP may be welfare improving compared to MCP

For instance,

Proposition 5 *Assume that* $n = 2$. *Consider (symmetric) linear demand functions,* $P_i(q_i, q_j) = \alpha - q_i - \nu q_j$ *where* $0 \leq \nu \leq 1$ *as well as a linear supply function* $P_x = \delta + \phi(x_i + x_j)$. *In addition, consider a Leontieff (constant return to scale) technology where* $q_i = kx_i$. *Then, below marginal cost pricing is always welfare improving compared to marginal cost pricing.*

Surplus analysis with simultaneous bargaining

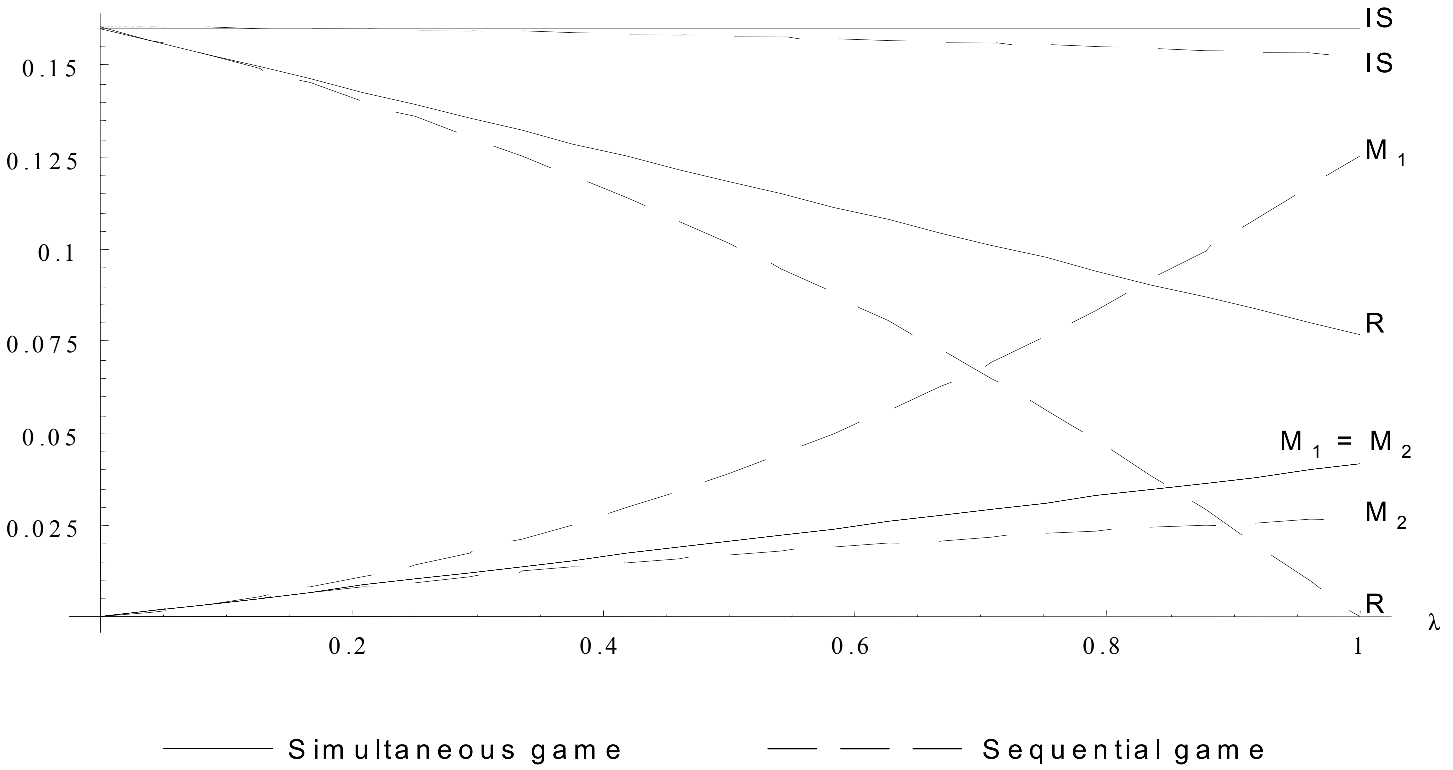
TABLE 1: Comparisons between below-cost pricing, marginal cost pricing and integrated vertical structure

	MCP	BMCP*	IVSP*
PS	0.0123	+4.06%	-7.32%
IS	0.1605	-0.19%	+0.12%
CS	0.0494	+3.85%	-7.08%
W	0.2222	+0.95%	-1.85%
$(w_i - \frac{\partial C_i}{\partial q_i})/w_i$	0.00%*	-4.41%**	+7.50%**
Average cost	0.3055	+0.36%	-4.12%
w_i	0.3333	-3.75%	+7.14%
P_i	0.6666	-0.93%	+1.80%

*: These values are in percentage of MCP. **: These percentages indicate the value of ratios.

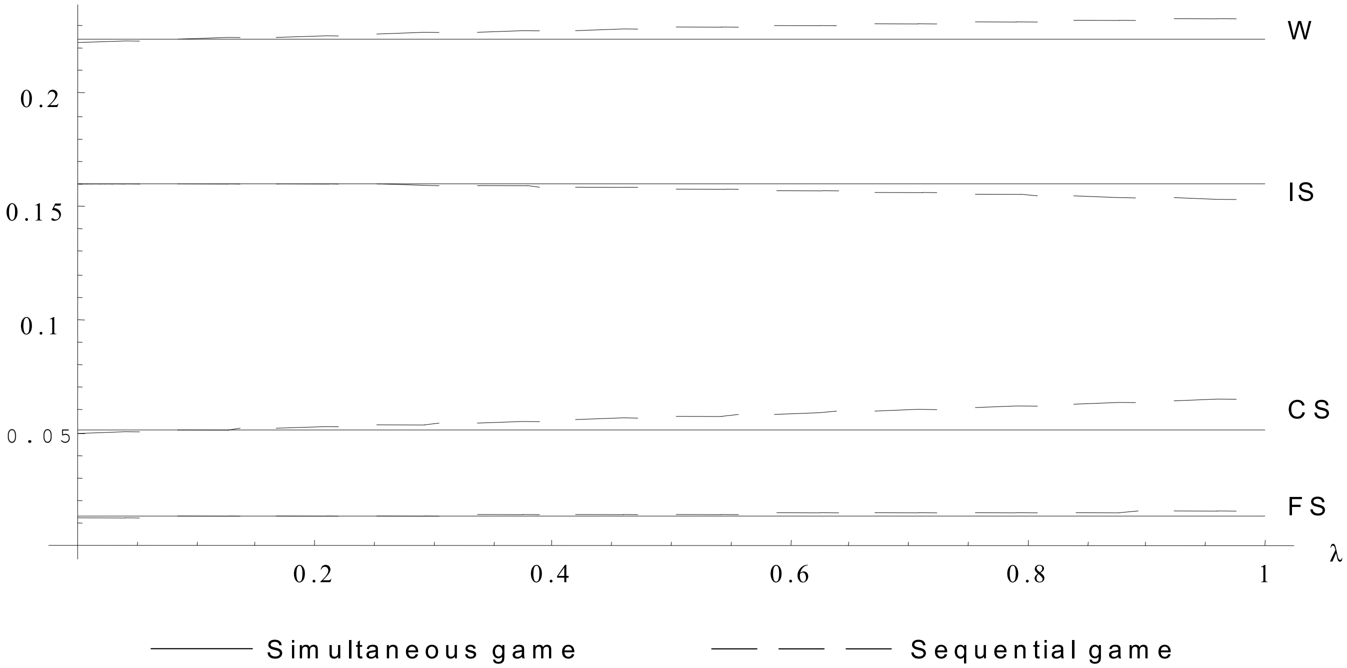
Surplus analysis

Balanced case: $\lambda=\lambda_1=\lambda_2$



The monopolist retailer always gains a strictly positive profit.
In the sequential game, the industry surplus decreases.
Being the first to negotiate is preferred by both manufacturers .
The retailer would most often play a simultaneous game

Surplus analysis 2



Consumers and upstream producers benefit from a strong bargaining power for manufacturers (increasing competition effect leads to increase in input price but low final price for product 1 which overcomes increase in product 2 price)

A strong bargaining power for the retailer implies a higher size of industry surplus

Overall, welfare increases with manufacturers' bargaining power

An unbalanced case

TABLE 3: Market equilibrium, profits and welfare in the unbalanced case

$\lambda_1 = 1, \lambda_2 = 0$	PS	IS	CS	W	π^R	π^1	π^2
Simultaneous game	1.28	16.02	5.13	22.42	11.85	4.17	0
Sequential game with M_1 first	-3.1%	0.1%	-2.7%	-0.7%	5.5%	-15.3%	-
Sequential game with M_2 first	19.5%	-4.6%	27.1%	4.1%	6.1%	-35.0%	-

$\lambda_1 = 1, \lambda_2 = 0$	$\frac{(w_1 - MC_1)}{w_1}$	$\frac{(w_2 - MC_2)}{w_2}$	w_1	w_2	P_1	P_2
Simultaneous game	-4.4%	-4.4%	32.08	32.08	66.04	66.04
Sequential game with M_1 first	2.5%	-4.6%	6.3%	-0.1%	1.5%	-0.03%
Sequential game with M_2 first	-3.5%	-80.5%	0.7%	-39.4%	0.2%	-9.6%

The retailer would prefer to negotiate with M_2 first (internalization effect disappears while rent-shifting effect is maximal)

M_1 would prefer simultaneous bargaining while retailer would prefer sequential bargaining

Conclusion

- Oligopsonistic behaviour and bargaining over contracts with a monopolist retailer

BMCP as a rule in the substitute case and may be welfare improving

- Inefficiency result for the industry

Degree of inefficiency depends on the form of contracts

- Extension of M&S in the sequential case

Extensions

- Comparative statics: in progress

Transmission of shocks at the upstream level, processing level and demand level on prices and surplus sharing

- More general contracts:

Non linear pricing, market share contracts

- More than one retailer: in progress

Links with multiprincipals-multiagents literature