Loyalty-Rewarding Pricing Schemes: Contract Space and Rent Shifting

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- When anti-competitive practices are banned, firms may resort to less effective, but legal, ways of achieving their anti-competitive goals, which may be even more harmful for welfare (Bernheim / Whinston, JPE 1998).
- For instance, loyalty-rewarding pricing schemes such as quantity discounts are imperfect substitutes for exclusive-dealing contracts.
- Hence, some of these pricing schemes have been (de facto) banned by competition authorities.
- Concern: If a buyer is close to earning the discount, a rival seller may be unable to attract this buyer even if this would be efficient.
- However, no general ban on these pricing schemes:
  - All-unit discounts: Almost per-se ban since Michelin II.
  - Incremental discounts and two-part tariffs: No cases known to me.
- Reason presumably: Efficiency excuses more or less plausible under different schemes.

- Most existing papers on anti-competitive use of discounts focus on rationalizing the anti-competitive strategy and ignore their substitution with other pricing schemes.
- This paper addresses the effect of a ban on some pricing schemes on firms resorting to less efficient ways of impeding competition:
  - I identify the way in which restriction to one of two commonly used discount schemes (all-unit versus incremental) restricts the contract space,
  - and compare equilibrium quantities, profit and welfare under restriction to these discount schemes to each other and to more general contract spaces,
  - under the assumption of anti-competitive motives for their use.

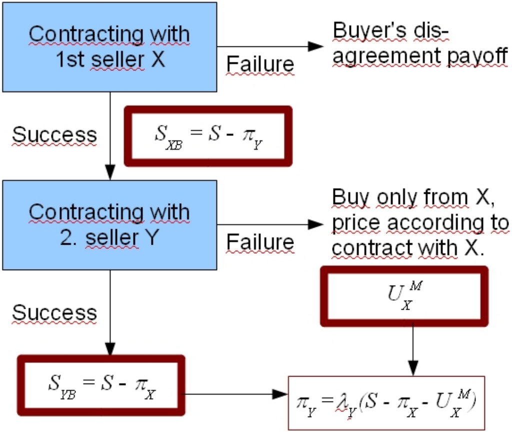
Outline

- Identify how restriction on specific kinds of contract restrict the choice of relevant parameters.
- This effect is independent of which post-Chicago model we have in mind.
- Analyze effect of this restriction on quantity distortions within multi-unit model of rent shifting.

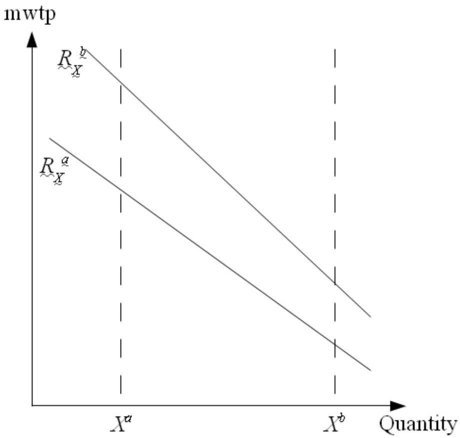
A Common Feature of Post-Chicago Models

- Discrimination between Exclusivity and Non-Exclusivity.
- Naked Exclusion: Discriminate between
  - targeted buyers, who sign exclusive-dealing contracts designed to outbid the entrant and
  - exploited buyers, who are left with their reservation utility.
- Rent Shifting: Discriminate between
  - entry, which is supposed to be the equilibrium outcome and for which contract terms thus determine efficiency and division of surplus, and
  - exclusion, which is off equilibrium, but determines incumbent's and buyer's joint equilibrium payoff.

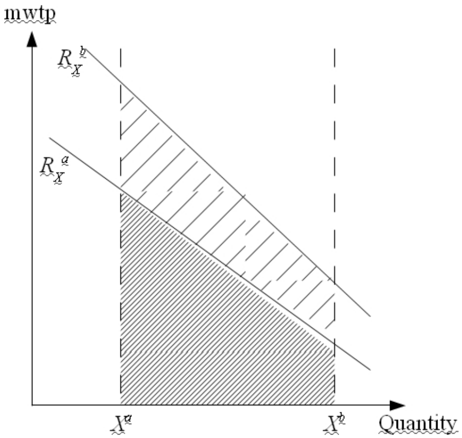
Rent Shifting



Outright Discrimination



Menu Contracts



Contractual Restrictions Imposed by Discount Schemes

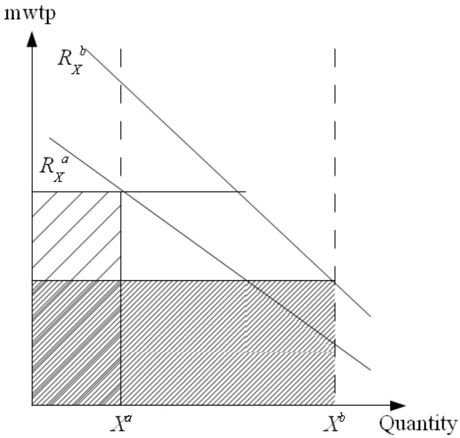
All Discount Schemes exhibit decreasing average price, which makes it impossible to punish large quantities.

- Lower bound to prices given by marginal willingness to pay.
- Upper bound to W_X^b given by W_X^a and the mwtp schedule.

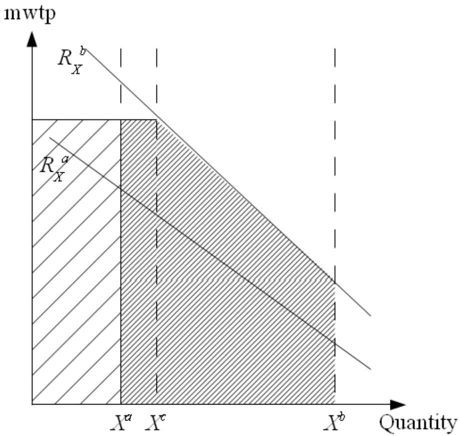
All-unit discounts:

- When reaching quantity threshold, rebate granted retroactively for units purchased previously.
- No additional restriction on relative attractiveness of a and b.

All-Unit Discounts: Lower Bound to W_X^b



All-Unit Discounts: Upper Bound to W_X^b



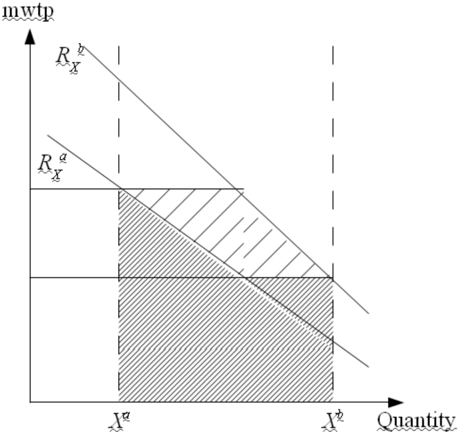
Incremental discounts:

- Apply only for units beyond the quantity threshold.
- As under AUD, only AP≥MP can be implemented.
- Furthermore: *Marginal* prices must be weakly above marginal wtp.
- This restricts the shape of the marginal price between X^a and X^b and thus the *difference* in average prices.

Summary of Difference:

- Both types impose restriction on *absolute* attractiveness of quantities.
- Additional restriction on *relative* attractiveness under incremental discounts.

Incremental Discounts



- Variation of the Marx/Shaffer (2008) model.
- Each seller X, Y produces a different variety (substitutes) of a non-durable good at constant MC c_X, c_Y.
- Buyer contracts sequentially with both sellers.
- Bargaining: Joint profit maximization and split-surplus rule according to relative bargaining powers λ_X, λ_Y.
- Contract between X and B specifies two prices and quantities:
  - X^a and W_X^a designed to be chosen on the equilibrium path,
  - X^b and W_X^b designed to be chosen in the off-equilibrium subgame where Y and B do not come to an agreement.
- Ban on market-share contracts.

- Difference to the Marx/Shaffer model: Some trade with incumbent seller X possible even before entrant Y enters.
- Follows concern by EC that early purchase at high prices may deter later entry.
- All discount schemes observed in practice refer to the total quantity purchased over the entire reference period.
- Efficiency excuse implausible.
- Hence: Assumption that discount schemes refer to *total* quantities.
- Timeline:

(i) Contract with X	(ii) First-Period Purchase (only from X) $R_1(x_1)$	(iii) Contract with Y	(iv) Second-Period Purchase (from both) $R_2(x_2, y_2)$

Linear mwtp Example

Sometimes clearcut results can be obtained only within an example with linear marginal willingness to pay, which rules out unintuitive third-order effects:

$$R_2(x_2, y_2) = a(x_2 + y_2) - \gamma x_2 y_2 - \frac{1-\gamma}{2}(x_2^2 + y_2^2)$$

together with

$$R_1(x_1) = \left(a_1 - \frac{x_1}{2}\right) x_1 .$$

See WP by Calzolari / Denicolo (2009)

Sketch of Analysis

Buyer and seller X's problem at stage (i): Maximize

$$S_{XB} = R_1(x_1) + R_2(X^a - x_1, Y^a) - c_X X^a - c_Y Y^a$$
$$-\lambda_Y \left[R_2(X^a - x_1, Y^a) - W_X^a - c_Y Y^a - (R_2(X^b - x_1, 0) - W_X^b) \right].$$

subject to the constraints:

- Buyer and seller Y jointly prefer X^a over X^b ('incentive constraint').
- W_X^a splits equilibrium payoffs according to relative bargaining powers.

Buyer's First-Period Quantity Decision

- The efficient way of allocating purchases between periods would be to equalize marginal willingness to pay for good X in each period:

$$R_1'(x_1^e) = \frac{\partial R_2(x_2^e, y_2^e)}{\partial x_2} = c_X.$$

- However, X^b determines the buyer's disagreement payoff in (iii) and will be taken into account in equilibrium:

$$R_1'(x_1^a) = \lambda_Y \frac{\partial R_2(X^b - x_1^a, 0)}{\partial x_2} + (1-\lambda_Y)\frac{\partial R_2(X^a - x_1^a, Y^a)}{\partial x_2}.$$

Total-Quantity Menu Contracts

- Consider the set of all pricing schemes depending only on own total quantity.
- Among these contracts, menu contracts which offer just two quantity-price pairs are optimal.
- Incentive compatibility requires

$$R_2(X^a - x_1^a, Y^a) - W_X^a - c_Y Y^a \geq R_2(X^b - x_1^a, Y^b) - W_X^b - c_Y Y^b$$

- Substitute in the objective function:

$$\begin{aligned} S_{XB} = & R_1(x_1^a) + R_2(X^a - x_1^a, Y^a) - c_X X^a - c_Y Y^a \\ & - \lambda_Y \left(R_2(X^b - x_1^a, Y^b) - c_Y Y^b - R_2(X^b - x_1^a, 0) \right) \end{aligned}$$

- In equilibrium:
  - First period: Excessive quantity of X
  - Second period: Quantity of X (Y) inefficiently small (large).

Specific Restriction to All-Unit Discounts

- Additional restriction satisfied by the equilibrium of the benchmark case for sufficiently 'important' first seller.
- If this additional constraint is binding, quantities are even more distorted:
- First-period quantity of X and second-period quantity of X (Y) smaller (larger) than under menu contracts.
- Quantities less efficient than under menu contracts.

Specific Restriction to Incremental Discounts

- New incentive constraint:

$$W_X^b - W_X^a \geq R_2(X^c - x_1, Y^c) - c_Y Y^c - [R_2(X^a - x_1, Y^a) - c_Y Y^a] + (X^b - X^c)\frac{\partial R_2(X^c - x_1, Y^c)}{\partial x_2}$$

- Strictly above lower bound under menu contracts (and all-unit discounts).
- Solution under all-unit discounts never available under incremental discounts.
- New objective function:

$$S_{XB} = R_1(x_1^a) + R_2(X^a - x_1^a, Y^a) - c_X X^a - c_Y Y^a$$
$$-\lambda_Y \left[R_2(X^c - x_1^a, Y^c) - c_Y Y^c - R_2(X^b - x_1^a, 0) + (X^b - X^c)\frac{\partial R_2(X^b - x_1^a, 0)}{\partial x_2} \right]$$

- If second seller's bargaining power is sufficiently small:
  - higher (lower) first-(second-)period quantities of good X,
  - which means lower efficiency.
- If second seller's bargaining power is sufficiently large and goods are sufficiently independent, incremental discounts may induce more efficient quantities than all-unit discounts.
- Joint surplus of buyer and seller X are always lower than under all-unit discounts.
- Ambiguous effect on efficiency when compared to all-unit discounts.
- Intuition:
  - For every set of quantities, the amount of rent shifting is smaller than in the benchmark case.
  - Hence, there may be less incentive to distort buyer's intertemporal allocation of purchases via high X^b.

Conclusions

- Depending on the entrant's bargaining power and the good's homogeneity, incremental discounts may be more or less efficient than all-unit discounts.
- In equilibrium, all-unit discounts are always chosen if they are permitted.
- Ban on all-unit discounts justified in some cases, but welfare reducing in other cases.

Suggestions for Discussion

- Critical assumption: Discount schemes may relate only to **total** quantity within the reference period.
- Idea for generalization:
  - Literature and competition authorities only focus on whether a certain practice may be used anti-competitively.
  - Ignore detrimental avoidance effects of banning an anti-competitive practice.
  - Analyze the principle that competition policy induces firms to resort to less suspicious, but also less efficient practices, within a more general model.
  - Has the L&E literature on marginal deterrence something to contribute?