# Multi-Product Bargaining, Bundling, and Buyer Power

Markus Dertwinkel-Kalt[1] and Christian Wey[2]

[1]University of Cologne
[2]Düsseldorf Institute for Competition Economics (DICE)

Competition and Bargaining in Vertical Chains
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- In the retailing industry, large manufacturers like Coca-Cola, Beiersdorf, or Nestle offer a range of products within a category which they sell to retailers.
- Large supermarket chains, as e.g., Tesco, or EDEKA invariably negotiate contracts that span manufacturers' entire product line.
- In the case of two products, bargaining between the manufacturer and the retailer is therefore over a payment $T(q_1, q_2)$ depending on the aggregate amounts purchased by the retailer.
- The price schedules often involve bundling features such as aggregate rebates on list prices (Shaffer, 1991) or slotting fees and promotion fees.

- Competition authorities are concerned about discounts by large firms because they can be used to exclude smaller rivals → Coca Cola was forced by the EU Commission to remove bundeled discounts between its main brand and other soft drinks (EC 2005).
- While most cases deal with powerful sellers (allegedly harming smaller rivals), the rise of powerful retailers has shifted competition authorities' focus on large buyers' barg. power and their contracting practices (e.g., EC 1999, FTC 2001, 2003, ECN 2012).
- Slotting allowances are seen as a barrier for smaller sellers as well as for small retailers which are often not affordable for them while large sellers with strong brands get preferential treatment (FTC, 2001, 2003; Aalberts and Judd 1991).
- Balto (2002) mentions a private litigation case, in which slotting fees required by large retailers (as Walmart) were interpreted in analogy to a discriminatory discount which worked as a "category killer" for smaller rival stores.

→ Critique of bundling features.

What is the effect unbundling of contracts has on outcomes?

- We analyze the Nash bargaining problem between an upstream monopolist (manufacturer M) and a downstream firm (retailer R) where M produces two (imperfectly) substitutable goods and sells them to R which has monopoly power in the final product market.
- We show that bundled discounts can be the result of both seller and buyer bargaining power in a bilateral trading relationship without any consideration of competition at either side of the (input) market.

→ If the bundling features of a payment scheme are removed (unbundling), outcomes are inefficient, profits & CS are reduced.

→ In negotiations between a multi-product upstream a downstream firm, efficiency requires bundling when the products are substitutable in both demand and cost. Forcing the firms to unbundle the products leads to inefficiencies.

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- Suppose M has almost TIOLI power. Given bundled contracts, R is then forced to accept a contract yielding a payoff close to its reservation payoff zero.
- Under unbundling, accepting only one contract can yield pos. payoff.
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- A reduction of the quantities reduces the total surplus to a lower degree than the retailer's revenue in case it accepts only one of the contracts.

$\rightarrow$ By reducing the contracted quantities below the efficient level, the retailer's incentive constraint is relaxed to the benefit of the (powerful) upstream firm.

OBS show: for substitutable products a strong barg. pos. of M can lead to inefficient outcomes if contracts are unbundled.

We show: for substitutable costs also large buyer power can lead to inefficient bargaining outcomes if contracts are unbundled (as M's ICs ensuring acceptance of all contracts become binding).

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- Suppose R has almost TIOLI power. Bundling $\rightarrow$ M accepts a contract that gives only little surplus to M.
- Unbundling $\rightarrow$ M enjoys much reduced production costs if it accepts only one contract (due to cost substitutability) $\rightarrow$ quantities are distorted *downward* in order to relax $M$'s incentive constraint; the downward distortion reduces joint profits by less than M's profit in case of accepting only one contract.

An upstream monopolist M produces two imperfectly substitutable products, 1 and 2, to be sold to a downstream monopolist R serving consumers in the final product market.

Four-stage game:

1) M and R negotiate a contract $T(\cdot,\cdot)$ via Nash bargaining which specifies the price R has to pay for quantities $(q_1, q_2)$ with $T(0,0) = 0$ and disagreement profits for both parties are zero.
2) R decides on the order quantities for both products.
3) M decides which orders to fulfill.
4) R sells the products to consumers and earns revenue $R(q_1, q_2)$.

Revenue $R(q_1, q_2)$, Costs $C(q_1, q_2)$

- Cost substitutability:

$$\frac{\partial C(q_1, q_2)}{\partial q_i} > 0 \quad \text{and} \quad \frac{\partial^2 C(q_1, q_2)}{\partial q_1 \partial q_2} > 0. \tag{1}$$

- Product substitutability:

$$\frac{\partial^2 R(q_1, q_2)}{\partial q_1 \partial q_2} < 0. \tag{2}$$

- Joint profits $R(q_1, q_2) - C(q_1, q_2)$ are assumed to have a unique maximum at $(q_1^I, q_2^I)$ for which $q_1^I, q_2^I > 0$ holds ("fully integrated outcome").
- Given contract $T(\cdot, \cdot)$ and quantities $q_1, q_2$, M earns $\pi_m = T(q_1, q_2) - C(q_1, q_2)$ and R earns $\pi_r = R(q_1, q_2) - T(q_1, q_2)$.

**Unbundling**:
When bundling is not feasible, the contract is additively separable, i.e., there exist contracts $T_1(q_1)$ and $T_2(q_2)$ s.t. $T(q_1, q_2) = T_1(q_1) + T_2(q_2)$.

**Bundling**:
A contract $T(q_1, q_2)$ exhibits bundling if and only there are no $T_1(q_1)$ and $T_2(q_2)$ with $T(q_1, q_2) = T_1(q_1) + T_2(q_2)$.

Define

$$\mathcal{A} := \{(q_1, q_2, T(\cdot,\cdot)) | (q_1, q_2) \in \arg\max_{\tilde{q}_1, \tilde{q}_2} \{R(\tilde{q}_1, \tilde{q}_2) - T(\tilde{q}_1, \tilde{q}_2)\}, T(q_1, q_2) \geq C(q_1, q_2)\},$$

so that Nash bargaining solves

$$\max_{(q_1, q_2, T(\cdot,\cdot)) \in \mathcal{A}} \pi_m^{\alpha} \pi_r^{1-\alpha}. \quad (3)$$

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Wlog, M and R bargain over quantity-forcing contracts $T^F(\cdot,\cdot)$ with $T^F(0,0) = 0$, $T^F(q_1', q_2') = F_B$ and $T^F(q_1, q_2) = \infty$ else (see OBS).

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Solve the restricted problem

$$\max_{q_1, q_2, F_B} (F_B - C(q_1, q_2))^{\alpha} (R(q_1, q_2) - F_B)^{1-\alpha} \tag{4}$$

with

$$F_B - C(q_1, q_2) \geq 0 \quad \text{and} \quad R(q_1, q_2) - F_B \geq 0, \tag{5}$$

s.t. M and R earn at least their disagreement profits.

FOC for $F_B$ and $q_i$ at an interior solution:

$$\alpha\pi_m^{\alpha-1}\pi_r^{1-\alpha} - (1-\alpha)\pi_m^{\alpha}\pi_r^{-\alpha} = 0,$$

$$-\frac{\partial C(q_1,q_2)}{\partial q_i}\alpha\pi_m^{\alpha-1}\pi_r^{1-\alpha} + \frac{\partial R(q_1,q_2)}{\partial q_i}(1-\alpha)\pi_m^{\alpha}\pi_r^{-\alpha} = 0, \text{ for } i = 1,2,$$

which implies that the solution fulfills

$$\frac{\partial R(q_1,q_2)}{\partial q_i} - \frac{\partial C(q_1,q_2)}{\partial q_i} = 0, \text{ for } i = 1,2.$$

**Proposition (O'Brien and Shaffer 2005)**

*Under bundling contracts, the manufacturer and the retailer maximize joint profits. Quantities are $(q_1^I, q_2^I)$.*

Unbundling means $T(q_1, q_2) = T_1(q_1) + T_2(q_2)$. Wlog the parties bargain over quantity-forcing contracts with $T_i^F(0) = 0$, $T_i^F(q_i') = F_i$ and $T_i^F(q_i) = \infty$ otherwise.

$$\max_{q_1, q_2, F_1, F_2} (F_1 + F_2 - C(q_1, q_2))^\alpha (R(q_1, q_2) - F_1 - F_2)^{1-\alpha},$$

s.t. the participation contraints hold, i.e.,

$$F_1 + F_2 - C(q_1, q_2) \geq 0 \quad \text{and} \quad R(q_1, q_2) - F_1 - F_2 \geq 0.$$

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In addition, the solution must be s.t. M accepts both contracts

$$F_1 - C(q_1, 0) \leq F_1 + F_2 - C(q_1, q_2), \tag{6}$$

$$F_2 - C(0, q_2) \leq F_1 + F_2 - C(q_1, q_2) \tag{7}$$

and s.t. R accepts both contracts

$$R(q_1, q_2) - F_1 - F_2 \geq \max_{q_2} R(0, q_2) - T_2^F(q_2), \tag{8}$$

$$R(q_1, q_2) - F_1 - F_2 \geq \max_{q_1} R(q_1, 0) - T_1^F(q_1). \tag{9}$$

**Lemma (O'Brien and Shaffer, 2005)**

*There exists* $\overline{\alpha} \in (0, 1)$ *such that for all* $\alpha > \overline{\alpha}$ *R's IC* (8) *and* (9) *bind. Equilibrium quantities are below* $q_1^I$, $q_2^I$ *then.*

Intuition: *Small reduction in* $q_1$ *and* $q_2$ *below* $q_1^I, q_2^I$ *has no first-order effect on joint profits, but relaxes both incremental-profit constraints as products are substitutes; the decrease in* $R$*'s profit from the reduction in* $q_1$ *(*$q_2$*) when it does not carry product 2 (1) more than offsets the decrease in* $R$*'s profit from an equal reduction in* $q_1$ *and* $q_2$ *when both are carried.*

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**Lemma**

*Suppose in equilibrium both products are provided in strictly positive quantities. Suppose the retailer's incentive constraints are slack. Then there exists $\underline{\alpha} \in (0,1)$ so that for all $\alpha < \underline{\alpha}$, constraints* (6) *and* (7) *bind.*

**Proposition**

*When contracts are unbundled and buyer power is sufficiently strong, i.e., $\alpha < \underline{\alpha}$ holds, either output levels are below $q_1^I$, $q_2^I$ or one product is not provided at all.*

Intuition: *$R$ relaxes $M$'s ICs by lowering quantities below $q_1^I$, $q_2^I$ in order to decrease $M$'s marginal production costs (i.e., to soften cost-substitutability) when all products are produced: this reduction has no first-order effect on joint surplus, but relaxes the ICs to a relatively large extent.*

**Proposition**

*Suppose products and costs are substitutable. If either $M$'s or $R$'s barg. position is sufficiently strong, both CS and SW are lower under unbundled than under bundled contracts.*

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Table: *Distortions depending on the cost and the demand specifications*

| | **subst. costs** | **indep. costs** |
|---|---|---|
| **subst. demand** | *distortion under buyer & seller p.* | *distortion under seller p.* |
| **indep. demand** | *distortion under buyer p.* | *no distortion* |

- We extend the analysis of OBS which shows that imposing unbundling restrictions on multi-product negotiations can lead to inefficiencies in the presence of powerful sellers.
- We show that a similar reasoning applies to powerful buyers: inefficiencies from unbundling restrictions can emerge because of cost substitutability.
- The reason is that large buyer power in association with cost substitutability gives rise to a binding IC for M (to accept all contracts). Taking this constraint into account in the Nash barg. problem leads to downward distorted output levels.

- Sales rebates or lump-sum payments are likely to fulfill the property of a bundling contract, and are being critically re-evaluated by competition lawyers and experts.
- Our analysis is informative for competition policy circles in which remedial solutions to the buyer power issue have been discussed - which range from installing a code of practice (as, for instance, in the UK) to a stricter enforcement of (EU treaty) Article 82 rules concerning the abuse of buyer power and vertical restraints.
- Ironically, our analysis suggests that imposing unbundling restrictions on vertical contracts can become the source of inefficient bargaining outcomes when retailers have strong bargaining positions.