Loss-leading in vertical markets: The role of consumers' loss aversion

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22nd Conference on Research on Economic Theory and Econometrics
Milos, July 10, 2024

Introduction

Retailers often offer deals on selected products **"while stocks last"**.

- Stockouts are more frequent for products on sale
  (Hess and Gerstner, 1987)

- Between 30% and 80% of consumers are willing to purchase a substitute within the same store when faced with a stockout
  (Anupindi, Dada and Gupta, 1998; Fitzsimons, 2000; Diels, Wiebach and Hildebrandt, 2013)

Bait-and-switch tactics that exploit consumers' loss aversion
(Rosato, 2016)

Our analysis

How can consumers' loss aversion affect dynamics in a vertical market?

- Multiproduct retailer $\Rightarrow$ bait-and-switch with loss-leading

  (a loss-leader product with limited stocks and a rip-off substitute)

- Upstream firm(s) $\Rightarrow$ coordination in supracompetitive prices

- $\uparrow$ Double marginalization,

Our analysis

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- Multiproduct retailer ⇒ bait-and-switch with loss-leading
  (a loss-leader product with limited stocks and a rip-off substitute)
- Upstream firm(s) ⇒ coordination in supracompetitive prices
- ↑ Double marginalization, **yet improving consumer welfare** compared to vertically integrated market

Related literature

Pricing under expectation-based loss aversion

(Heidhues and Kőszegi, 2008; Herweg et al., 2010; Zhou, 2011; Spiegler, 2012; Herweg and Mierendorff, 2013; Heidhues and Kőszegi, 2014; Karle and Peitz, 2014; Carbajal and Ely, 2016; Rosato, 2016; Hahn et al., 2018; Leontiou and Ziros, 2024)

Collusive mechanisms in vertical markets

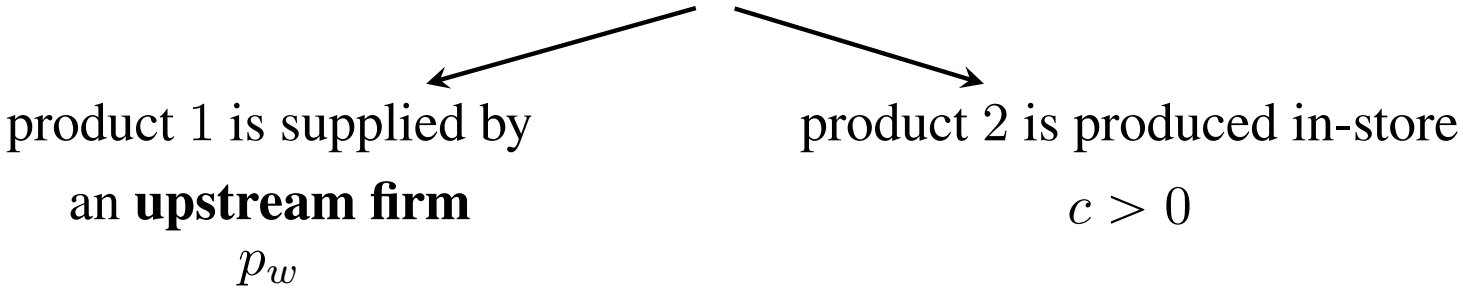
(Rey and Vergé, 2004; Jullien and Rey, 2007; Nocke and White, 2007; Normann, 2009; Nocke and White, 2010; Miklós-Thal et al., 2011; Rey and Whinston, 2013; Reisinger and Thomes, 2017; Gilo and Yehezkel, 2020; Hunold and Muthers, 2024)

Loss-leading in vertical markets

(Inderst and Obradovits, 2022)

Model

- 1 **multiproduct retailer** $\Rightarrow$ products 1 and 2



- The upstream firm faces zero marginal cost.

- Unit mass of **identical consumers** with $v_1 = v_2 = v > 0$ (perfect substitutes) and reference-dependent preferences á la **Kőszegi and Rabin (2006)**

  Consumers form expectation-based reference points regarding their upcoming purchase and they dislike any deviation from it $\Rightarrow$ **loss aversion**

Koszegi and Rabin (2006)

Timing

$t = 0$ $\Rightarrow$ Upstream firm sets p_w

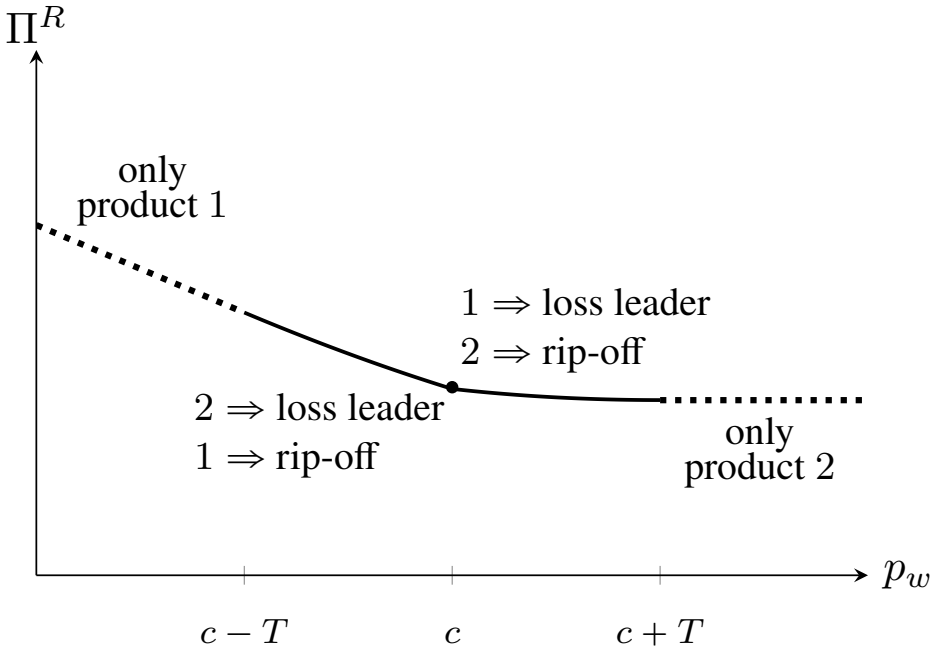
$t = 1$ $\Rightarrow$ Retailer announces the prices p_1 and p_2 and chooses their availability, q_1 and q_2.

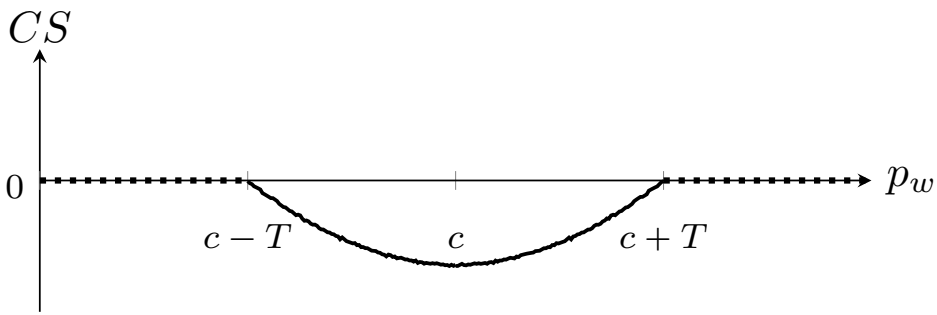
Consumers observe only the prices and form expectations (reference point) regarding their upcoming purchase. They choose a purchase plan that maximizes their expected utility. consumer's problem RI

$t = 2$ $\Rightarrow$ Uncertainty is resolved and consumers execute their plans.

Emergence of Bait-and-switch

Loss aversion encourages "bait-and-switch" strategies





<u>bait-and-switch</u>

loss leader: $p^s < v$ with $q \in (0,1)$

rip-off: $p^r > v$ with $1-q$.

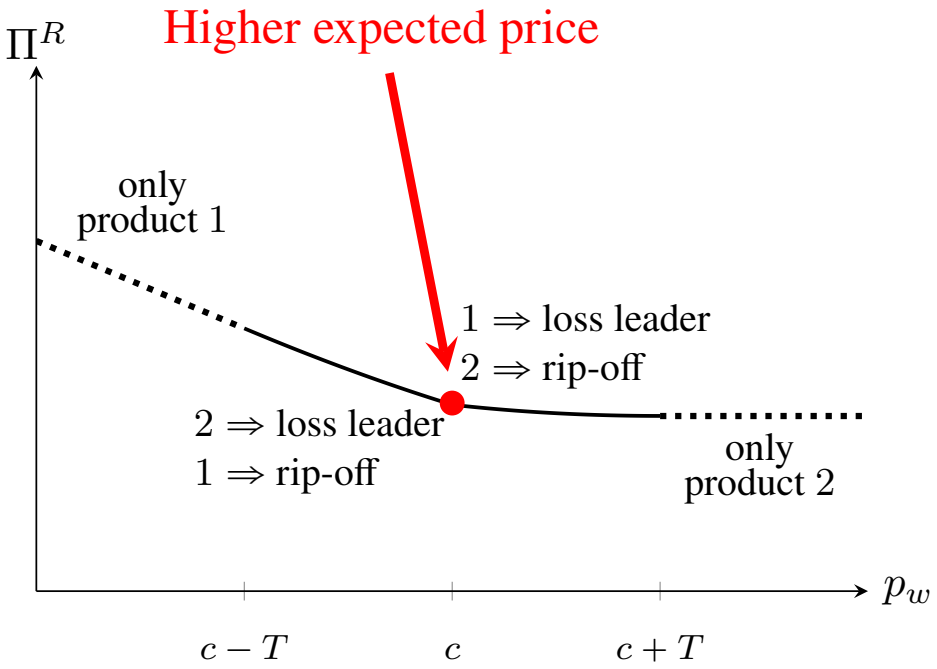
availability of the loss leader:

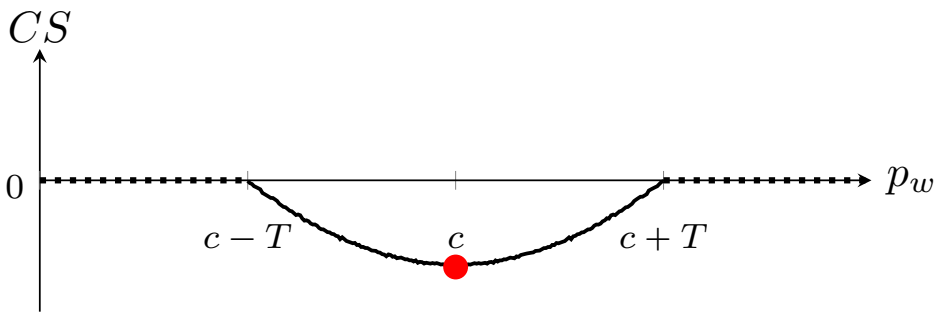
$$q = q(|p_w - c|) < \tfrac{1}{2}$$

<u>only product i</u>

$p_i = v$ with full availability

Emergence of Bait-and-switch





Expected price for consumers

$$\mathbb{E}_P = q\, p_s + (1-q)\, p_r(q)$$

$$\frac{\partial E(p)}{\partial |p_w - c|} < 0$$

the highest expected price is achieved at $p_w = c$

Upstream firm

For sufficiently low marginal cost, the upstream firm compensates for its low demand by setting a high wholesale price.

- When $c < \hat{c} \in (0, v)$, then the upstream firm sets $p_w > c$

Example: let $\boldsymbol{c = 0}$ if $p_w \leqslant c \Rightarrow \Pi^U = 0$

but if $p_w > c \Rightarrow \Pi^U = q\, p_w > 0$

$\uparrow$ **double marginalization** $\Rightarrow$ $p_w > c$

$\uparrow$ **sales of the inefficient product** $\Rightarrow$ rip-off = retailer's product with availability $1 - q > \frac{1}{2}$

Vertical Integration & Welfare $(c < \hat{c})$

Integrated firm $\Rightarrow$ bait-and-switch $\Rightarrow$ product 2 = loss leader, product 1 = rip-off

Total welfare: Vertical integration corrects inefficiencies created by consumers' loss aversion

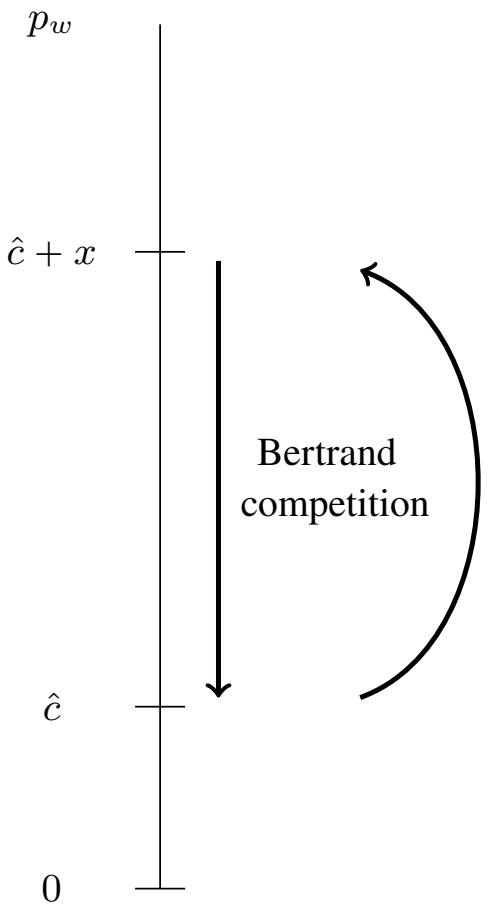
$$W^{\text{vertical integration}} = v - q\,c < v - (1-q)\,c = W^{\text{double marginalization}}$$

but

Conusmer surplus: Despite double marginalization, consumers are better off in the disintegrated market.

$$|p_w - c| > |0 - c| \;\Rightarrow\; \mathbb{E}_P^{\text{double marginalization}} < \mathbb{E}_P^{\text{vertical integration}}$$

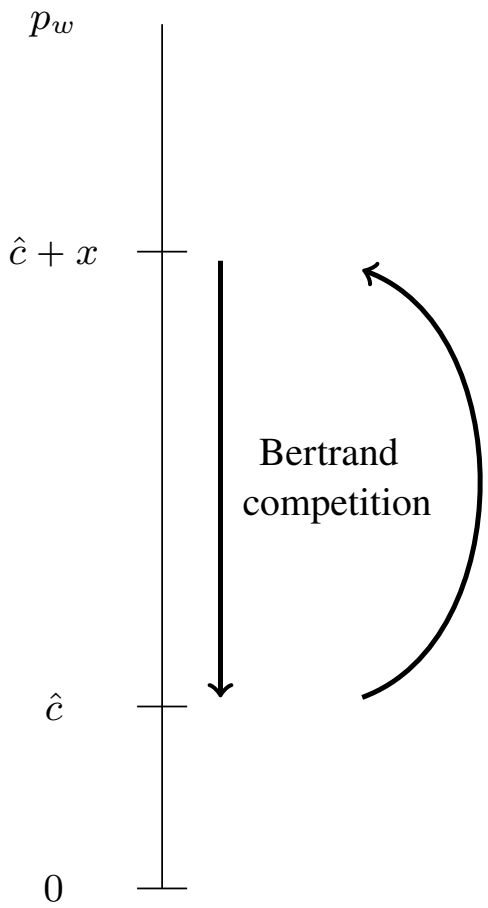
Upstream competition



- 2 Upstream firms: $U_1 \Rightarrow \quad p_w^1$ $U_2 \Rightarrow \quad p_w^2$
- Bait-and-switch always emerges in equilibrium.
- Products are perfect substitutes but the retailer does not buy only the cheapest one.
- **Despite competition, both upstream firms achieve positive markups!**

The equilibrium wholesale price p_w^i of upstream firm $i = 1, 2$ is a probability distribution over prices on $[\hat{c}, \hat{c} + x]$, where $\hat{c} \in (0, v)$ and $x \in (0, T)$.

Upstream competition



A vertically integrated market implies $p_w^1 = p_w^2 = 0$

$\Rightarrow$ Highest expected price for consumers

Consumers are better off with competition and double marginalization than with a vertically integrated market.

$$|p_w^1 - p_w^2| > 0 \Rightarrow \mathbb{E}_P^{\text{double marginalization}} < \mathbb{E}_P^{\text{vertical integration}}$$

Conclusions

- Consumers' loss aversion $\Rightarrow$ loss-leading (bait-and-switch) $\Rightarrow$ vertical collusion
- Despite loss not directly driving the demand of their products, upstream firms offset their losses by charging supra-competitive wholesale prices.
- Double marginalization raises, but consumers are better off than with a vertically integrated market.
- **Extensions:**
  - Preliminary results on resale price maintenance
  - Pass-through implications

Thank you for your attention!

Reference dependence (Kőszegi and Rabin 2006)

Overall utility = Actual utility + Gain-loss utility

Actual utility $= v_i - p_i$

Gain-loss utility

$$\mu(x) = \begin{cases} \eta\, x, & \text{if } x \geqslant 0 \\ \eta\, \lambda\, x, & \text{if } x < 0 \end{cases},$$

where $\eta > 0$ is the weight attached to the extra gain or loss

$\lambda > 1$ is the coefficient of loss aversion

$x = (v_i - r^v)$ or $(r^p - p_i)$

Reference points $\Rightarrow$ a pair of probability distribution $F = \left(F_v, F_p\right)$

$$U\left[(v_i, p_i)|(v^r, p^r)\right] = v_i - p_i + \int_{v^r} \mu\left(v_i - r^v\right)\, dF_v(v^r) + \int_{p^r} \mu\left(r_p - p_i\right)\, dF_p(r^p)$$

Consumers' Problem

- Given (p^s, p^r), consumers form rational expectations $S \subseteq [0,1]^2 \times \mathbb{R}^2_+$ regarding the availability of each product.

- Potential purchase plans: $\sigma : S \to \{\{\varnothing\}, \{\text{bargain}, \varnothing\}, \{\text{bargain}, \text{rip-off}\}\}$

- The distribution over final purchase outcomes is $G_{S,\sigma}$.

- Plan σ is a

  Personal Equilibrium $\Rightarrow U(\sigma|G_{S,\sigma}) \geqslant U(\sigma'|G_{S,\sigma})$ for any $\sigma \neq \sigma'$

  Preferred Personal Equilibrium $\Rightarrow$

  $EU_{G_{S,\sigma}}\left(\sigma|G_{S,\sigma}\right) \geqslant EU_{G_{S,\sigma'}}\left(\sigma'|G_{S,\sigma'}\right)$ for any σ' that is also a UPE.

(Kőszegi and Rabin 2006)

Profit maximization problems

Let $\sigma^{\star}(S)$ denote consumers PPE, given the announced prices by the retailer.

Retailer

$$\max_{p_1,p_2,q_1 q_2} \Pi^R\left(p_1,p_2,q_1,q_2\right) = q_1(p_1 - p_w) + q_2(p_2 - c)$$
$$s.t.\ \ EU_{G_{S,\sigma^{\star}(S)}}\left(\sigma^{\star}(S)|G_{S,\sigma^{\star}(S)}\right) \geqslant EU_{G_{S,\sigma'}}\left(\sigma'|G_{S,\sigma'}\right)$$

Upstream firm

$$\max_{p_w} \Pi^U\left(p_w\right) = q_1(p_w)p_w$$

Back

RI-equilibrium

Reordered game:

$t = 0 \Rightarrow$ Upstream firm sets p_w

$t = 1a \Rightarrow$ Retailer chooses the product availability, q_1 and q_2

$t = 1b \Rightarrow$ Retailer announces the final prices p_1 and p_2

Consumers observe only the prices and form expectations regarding their upcoming purchase. They choose a purchase that maximizes their expected utility.

$t = 2 \Rightarrow$ Uncertainty is resolved and consumers execute their plans.

Reordered-Invariance Equilibrium:

A strategy (p_1, p_2, q_1, q_2) is a RI-equilibrium if it results in consumers' PPE plan, $\sigma^\star(S)$, that is also part of a subgame-perfect equilibrium in the reordered game.

Back

Final prices

Consumer's expectations for the availability of each product: $S \subseteq [0,1]^2 \times \mathbb{R}^2_+$

Purchase plans: $\sigma : S \to \{\{\varnothing\}, \{\text{loss-leader}, \varnothing\}, \{\text{loss-leader}, \text{rip-off}\}\}$

Bait-and-switch

$p_s = v\,\frac{1+\eta}{1+\eta\,\lambda} \quad \Rightarrow \quad$ eliminates $\{\varnothing\}$

$p_r = v + \frac{2\,\eta\,(\lambda-1)\,q}{1+\eta\,(\lambda-1)\,q}\,p_s \Rightarrow$ Consumers are indifferent between $\{\text{loss-leader}, \text{rip-off}\}$ and $\{\text{loss-leader}, \varnothing\}$

Availability level of the loss leader $\Rightarrow \quad q(|p_w - c|) \in (0, \frac{1}{2})$

Consumers buy the loss-leader if available, and the rip-off otherwise

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