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"A Strategic Motivation for Commodity Bundling," JIE March 1990

Firm 1 = monopolist on A, competes with 2 on B—perfect substitutes. Zero costs (simplify).

Consumers: unit demands for A & B, valuations perfectly positively correlated, uniformly distributed:

$$v^A = v^B = v \sim U[0, 1]$$

(Perfect positive correlation rules out price discrimination role for bundling; McAfee et al. 1989).

No Bundling: 1 sets monopoly price on A: $p^A = ¼$; Bertrand competition yields: $p^B = 0$ for both firms.

Bundling: 2-stage game: First, firm 1 commits to bundle or not. Then prices chosen simultaneously.

Bundling essentially transforms 1's good in B from being a perfect substitute to 2's to, instead, being *vertically differentiated*, because the "good"—now only supplied in a bundle—includes also a unit of A. This differentiation, in turn, softens price competition: 2 is induced to raise p^B which benefits 1.

Analogy with vertical differentiation model: let b denote bundle. Then

- For a consumer of type v, value for B is v, value for b is 2v, so extra value for b is simply v
- If $2v/p^b > v/p^B$ then b yields higher value *per $* so only b is sold. (There is no gain to 1 from bundling in this case, because 2 will set $p^B = 0$, as in the no bundling case.)
- Consider therefore $\frac{2v}{p^b} \leq \frac{v}{p^B} \Leftrightarrow 2p^B \leq p^b \Leftrightarrow p^B \leq p^b - p^B$
- Note that $p^b - p^B$ is the implicit price for A in the bundle (since *B* can be bought from 2 at p^B).
- Given a pair (p^b, p^B), consumers are partitioned into 3 intervals:
- High types buy b from 1: $p^b - p^B \leq v \leq 1$
- Medium types buy B from 2: $p^B \leq v \leq p^b - p^B$ [Low types don't buy: $v \leq p^B$]
- Suppose, counterfactually, that 1 sets $p^b = ½$, i.e., at the sum of the original prices (old monopoly level for A, 0 for B). Firm 2 would no longer set $p^B = 0$, because 2 becomes a monopolist on the residual demand $q^B = ½ - p^B$ (all the types $v \leq ½$), so would set $p^B = ¼$. Raising p^B in turn benefits firm 1 — indeed, this is *the* reason why 1 gains: bundling essentially commits firm 1 not to price as aggressively against firm 2 in B, which coaxes 2 to raise price (so in the actual equilibrium, $p^b > ½$ and, anticipating that 1 will raise price, $p^B > ¼$).
- In terms of Tirole's "animal taxonomy," bundling here makes firm 1 a "fat cat."

- It is easy to verify that the equilibrium values are $p^b = 4/7$, $p^B = 1/7$ and $q^b = 4/7$, $q^B = 2/7$:
- Demand functions and profit functions are given by

$$D^b(p^b,p^B) = 1-(p^b - p^B), \qquad \pi^b(p^b,p^B) = [1-(p^b - p^B)]p^b$$

$$D^B(p^b,p^B) = (p^b - p^B) - p^B = p^b - 2p^B, \qquad \pi^b(p^b,p^B) = [p^b - 2p^B)]p^B$$

- The FOCs are therefore,

(1) $$\frac{\partial\pi^b}{\partial p^b} = 0 \Leftrightarrow 1-2p^b + p^B = 0 \qquad \Rightarrow p^b = R_1(p^B) = \frac{1+p^B}{2}$$

(2) $$\frac{\partial\pi^B}{\partial p^B} = 0 \Leftrightarrow p^b - 4p^B = 0 \qquad \Rightarrow p^B = R_2(p^b) = \frac{p^b}{4}$$

- Notice that the Best Response functions R_1 and R_2 are upward sloping—prices are "strategic complements."
- Solving (1) and (2) simultaneously gives $p^b = 4/7$, $p^B = 1/7$.