Vertical Restraints + Ho, Ho, and Mortimer (2011) Full-Line Forcing

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Vertical Control

Manufacturers don't sell directly to final consumers; typically, industry is vertically separated into upstream and downstream firms

- Interaction between upstream and downstream firm often involves standard market features: price discrimination, mergers, entry, etc
- Downstream firms can affect profits of upstream firm
  - Determine retail price
  - Take promotional effort
  - Determine levels of inventory to hold of a product
  - Determine promotion and placement of competing products
  - Contribute technological inputs (refrigeration, etc)

Vertical Control

Why maintain separation?

- Increasing returns to sales and distribution by downstream specialists
- Consumer demand for variety, service
- Integration of complementary products

But, in imperfectly competitive markets, there is loss from double marginalization

- When the retailer and manufacturer each mark-up a good independently of one another, there exists an externality. The resulting profits $<$ vertically-integrated profit

Types of vertical restraints

- Exclusive territories
  - Upstream firm assigns a single downstream firm monopoly rights to sell in an area. See Asker (2004)
- Exclusive dealing
  - Downstream firm is not allowed to carry the brands of a competing upstream (manufacturing) firm
- Full-line forcing
  - Dealer commits to sell all the varieties of the manufacturer's products rather than a limited set
    - Mixed bundling – can buy components or bundle
    - Bundling – can only buy the bundle, but not components

Types of vertical restraints (continued)

- Resale price maintenance
  - Dealer commits to a retail price or range of retail prices for the product: minimum/maximum resale price maintenance
  - Quantity forcing or quantity rationing
- Other Contractual arrangements
  - Franchising, profit sharing/revenue sharing

Purposes of restraints

- Externalities between downstream and upstream (use max RPM, quantity forcing, full-line forcing)
  - Use tools to avoid double marginalization problem
- Downstream moral hazard, externalities from intrabrand competition (exclusive territories, minimum RPM, quantity rationing)
  - Manufacturer wants to incentivize retailer to provide service
- Interbrand competition (exclusive dealing, full-line forcing)
  - Manufacturer suffers when retailer sells brands other than its own

Goals of Paper

- Theory Testing
- Measurement
- Methodology

Goals of the Paper

- Theory Testing
  - What are the profit consequences for the manufacturer from offering retailers full-line forcing contracts?
  - Does it reduce consumer choice or lead to higher prices?
- Measurement
  - Quantify how consumer demand, retailer revenues and costs, and distributor revenues change when adding/removing FLF from contract mix.
- Methodology
  - Emphasizes how the frequent rotation of products in the market provides variation in choice sets that may be helpful for identifying demand patterns.
  - "Role model" of bundling analysis: combine detailed demand side estimation of substitution with supply side model of firm's costs from adding inventory.

Setting

Innovation in recording rental transactions led to contract innovation:

- Linear pricing – \$65-70 upfront fee per tape
- Revenue sharing - \$8 upfront + 55% of rental revenue per tape
  - Have min and max quantity restrictions
- FLF – rental store purchases all titles of distributor
  - Terms like RS, but lower up-front fee (\$3.60) and lower rev share (retailers keep 59%)
- Sell-through priced (STP) titles
  - Distributor sells tapes to consumers and retailers for \$20-25 per tape
  - Choice of this contract type not in model

Setting

Selection on contract type?

- What type of movies should retailer choose to accept under each contract type? (Mortimer (2008))
  - LP for high volume videos/new releases?
  - RS for niche films? RS usually have higher minimum quantity restrictions than the avg # of tapes bought under LP contracts.
- What type of retailer accepts FLF contract? Blockbuster vs. small retailer?

Setting

How does inventory choice affect retailer profits?

- Can increase retailer profits by attracting new consumers to store. (included in costs of holding inventory)
- High inventory may lead to high initial demand (consumers see more tapes on shelf); can reduce later month sales (included in costs of holding inventory)
- Sales of substitute products fall with higher inventory on focal product (see demand model)

Data

- Rentrak, facilitates monitoring & payments for RS and FLF contracts between retailers and distributors
- 7525 retailers (excluding Blockbuster, Hollywood Video), for 1998-2001.
- Have transaction data for 1,025 titles released: total monthly revenue of store, zip code, size of chain, product mix detail (game, adult, rental, and sales revenue shares)
- Local demographics from Census by zip code
- Title details: distributor id, month of release, genre, MPAA rating, box office categories
- Contract terms and # tapes bought under each contract at store-title-week level

Model

Demand: Flexible nested logit model

$$
\begin{aligned}
u_{ijmt} &= \delta_{jmt} + \zeta_{igmt} + (1-\sigma)\varepsilon_{ijmt} \\
\delta_{jmt} &= \delta_j + \gamma_j z_m + \eta_m + \theta_t + \beta_t x_j + \lambda_t c_{jm} - \alpha p_{jmt} + \xi_{jmt}
\end{aligned}
$$

- $(\delta_j, \eta_m, \theta_t)$ - title, store, months-since-release fixed effects
- p_{jmt} average price per rental of the tape at store m in month t
- c_{jm} inventory of title j at store m
- ξ_{jmt} unobservable quality of renting j in market m in month t
- Decay rate over months, θ_t, common to genre+rating+box office category

Model

$$\ln(s_{jmt}) - \ln(s_{0mt}) = \delta_j + \gamma_j z_m + \eta_m + \theta_t + \beta_t x_j + \lambda_t c_{jm} - \alpha p_{jmt} + \sigma \ln(s_{jmt/gmt}) + \xi_{jmt}$$

- Nests: genre + box office class group. σ is the correlation of the idiosyncratic preferences within group.
- Set market size to determine share of outside good.
  - Observe only one store in a market, but there are N in phonebook. Store gets 1/N of population (stores are exact substitutes; demand shifts across movies within a store, not across stores).
- Endogeneity: FLF changes composition of choice set (share of title within its group), inventory of each title, price per rental

Model

Instruments

- Inventory IV: avg inventory of the same title across stores of the same tier
  - costs of taking inventory are correlated across stores of the same size, but unobserved demand shocks in market X not related to unobserved shocks in market Y (title and title*(area demographics) fixed effects pick up most correlated shocks)
  - variation in IV comes from different min and max quantity restrictions imposed by distributor

Model

Instruments (continued)
Share of title within group IV:

- (1) log of avg # of movies of the same type (box-genre-store group) in a month, avg over stores in same size tier.
  - Correlated with the # competitors to this title in the store
- (2) avg of ln(s_jmt/gmt) for the same title-month pair across stores of the same tier
  - correlated with ln(s_jmt/gmt) in focal market
  - IV only affects shares in focal market through its effect on ln(s_jmt/gmt) in the focal market.

Price

- None. Unobservable, after fixed effects, at the store-title level. Price changes at store-title level exogenous to demand shocks (employees randomly change new release stickers)?

Model

Retailer portfolio choice problem

- Moment inequalities to bound the value of holding inventory (do not model complicated retailer equilibrium strategies)
- Intuition:
  - In average, stores profits from the observed portfolio of titles and choices of inventory must exceed profits from alternative portfolios/inventory
  - Dropping a title gives you upper bound to costs of holding inventory
  - Adding tapes (say, 10%) provides lower bound on value of holding inventory.

Model

Retailer portfolio choice problem (continued)
Procedure

- Calculate share of title at store m at time t using demand estimates.
- Determine total returns to the store under its inventory constraints (determined by the contracts it entered).
- Subtract off payments to distributor and the costs of holding a tape to find profits.

Model

Inequalities

$$E[\pi_m^{obs}(.)|I_m] \geq E[\pi_m^{altj'}(.)|I_m]$$

$$\pi_m^{obs} = \sum_s \sum_{j \in J_s} (r_{jm}^{obs}(.) - C(.)\widetilde{c}_{jm}) + \eta_m + \rho(\widetilde{c}_{ms}, k_{ms}) + \varepsilon_{ms}$$

- Assume η_m, $\rho(\widetilde{c}_{ms}, k_{ms})$ difference out
- Have instruments, $Z_{ms'} \subset I_m$
- $E[\varepsilon_{ms}|Z_{ms'}] = 0$
- Use as IV's {constant; indicators for size of store}
- Rules out error term that differs by contract type and that are structural–that is, choice of contract depends on error.
    - STRONG - claim is that specification of inventory holding value captures all elements in I_m

Model

- BUT, selection effect, conditional on observed choice!
- See Pakes (2011), Dickstein and Morales (2012)

Counterfactual experiments to infer the effect of FLF contracts on profits of distributors

- Predict retailer and distributor profits under FLF
- Predict profits were FLF not available, allowing retailer to reoptimize their static portfolio decision
- Compare profits under these two scenarios.

Results

Demand model

- R^2 of .8; model fits data well; useful for counterfactuals
- Instrumenting for within group shares reduces σ coefficient (there are demand shocks that affect both within-group share and total demand)
- Price coefficients negative, apart from SW region

Supply model of inventory costs

- Find a singleton value of holding inventory
- Larger stores and chains have a lower cost per tape
- Store generates a positive value from holding tapes
    - Generates revenue from selling used tapes; model might miss volume discounts; may be value to holding variety
- Most retailers have a higher value per tape for LP titles than RS titles

Results

Counterfactuals

- Most distributors make profit-maximizing decisions about whether to offer FLF (implied by supply model?)
  - Retailers who take videos from non-FLF distributors have high take up rates of titles without the contracts. In the counterfactual, the distributor offers FLF with more generous prices (to get firm to take whole line); find the distributor harmed–they could have gotten uptake without the vertical restraint.
  - Those who offer FLF to retailers would not have attracted those retailers were it not to offer the retailer the generous terms under FLF. Profit maximizing for them to do so.
- Retailers benefit from the added contract option, as long as the default option remains.