Vertical markets

Vertical markets

Vertical Relations

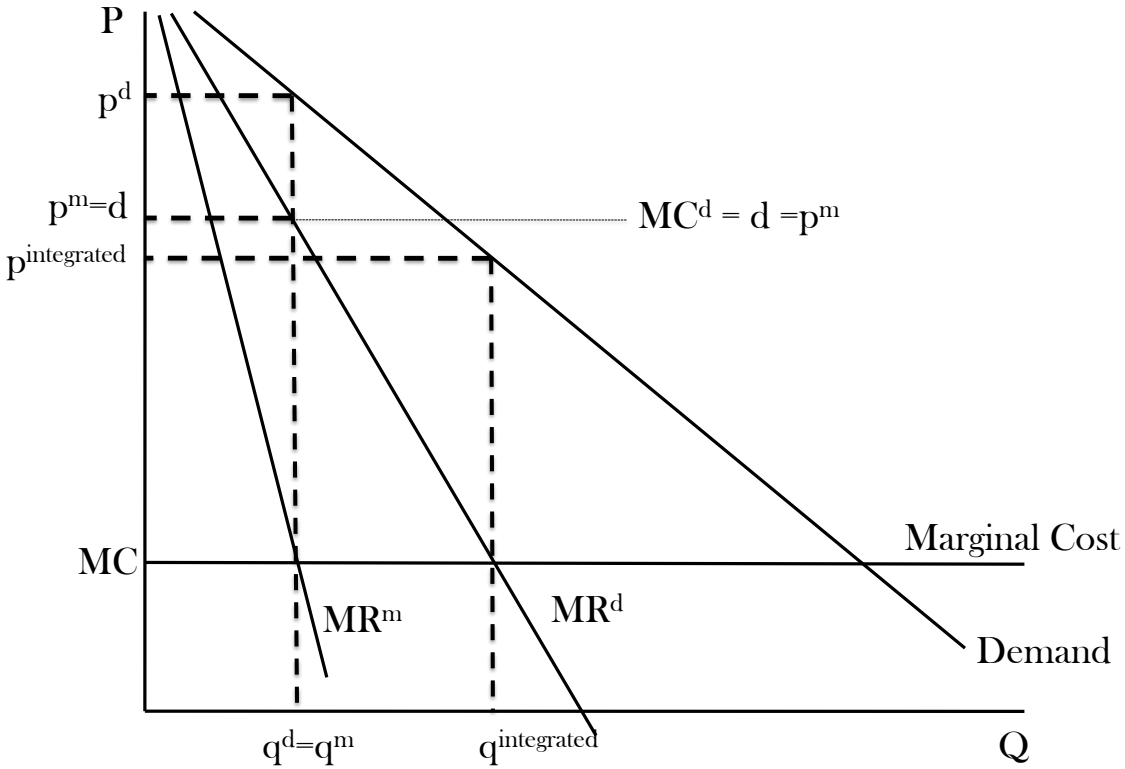
Production and distribution chains are often made up of different firms. Manufacturers (upstream firms) rarely supply final consumers directly. Retailers (downstream firms) often make important decisions regarding the product.

1. determination of final price
2. promotional effort
3. placement of product on store shelves
4. promotion and placement of competing products
5. technological inputs

Vertical markets

Example of incentive misalignment #2: Double Marginalization

Figure: Double Marginalization: The Diagram



MinRPM and service/sales effort/advertising

Consider the example of promotions or advertising. Assume (inverse) demand is given by

$$p = \sqrt{A} - Q$$

The manufacturer sells to two dealers who compete a la Bertrand. Denote the wholesale price as d and advertising expenditures as A_1 and A_2, where $A = A_1 + A_2$.

Result 1: For any given d, no dealer will engage in advertising and demand will shrink to zero, with no sales.

Vertical markets

Sales effort & RPM

Result 1: For any given d, no dealer will engage in advertising and demand will shrink to zero, with no sales.

Why?

Firms compete in price, and they sell a homogeneous product. What does p equal in this case? What is profit?

Vertical markets

Sales effort & RPM

How can Resale Price Maintenance solve this?

Minimum Resale Price Maintenance: $p = p^{RPM} \geq d$
Now demand is

$$Q = \sqrt{(A_1 + A_2)} - p^f$$

Assume that quantity demanded is split evenly between the two retailers. The only strategic variable for the retailers is A. Thus, writing profits as a function of A and finding the F.O.C. yields:

$$\pi_i = \frac{\sqrt{(A_i + A_j)} - p^f}{2}(p^f - d) - A_i$$

Vertical markets

Sales effort & RPM

$$\pi_i = \frac{\sqrt{(A_i + A_j)} - p^f}{2}(p^f - d) - A_i$$

F.O.C. wrt A:

$$0 = \frac{\partial \pi_i}{\partial A_i} = \frac{p^f - d}{4\sqrt{(A_i + A_j)}} - 1$$

Note that we can only identify the sum of $A_1 + A_2$ and not A_1 and A_2 individually (although if we restrict ourselves to a symmetric Nash equilibrium we can). But the idea is that retailers will compete on promotion now. As long as $p^f > d$ then at least one retailer has an incentive to advertise, and the total dollars spent on ads increases with the markup.

Vertical markets

Sales effort & RPM

Symmetric Nash:

F.O.C. wrt A:

$$0 = \frac{\partial \pi_i}{\partial A_i} = \frac{p^f - d}{4\sqrt{(A_i + A_j)}} - 1$$

$$0 = \frac{p^f - d}{4\sqrt{2A}} - 1$$

$$4\sqrt{2A} = p^f - d$$

$$A = \frac{1}{2}\left(\frac{p^f - d}{4}\right)^2$$

Vertical markets

Exclusive territories

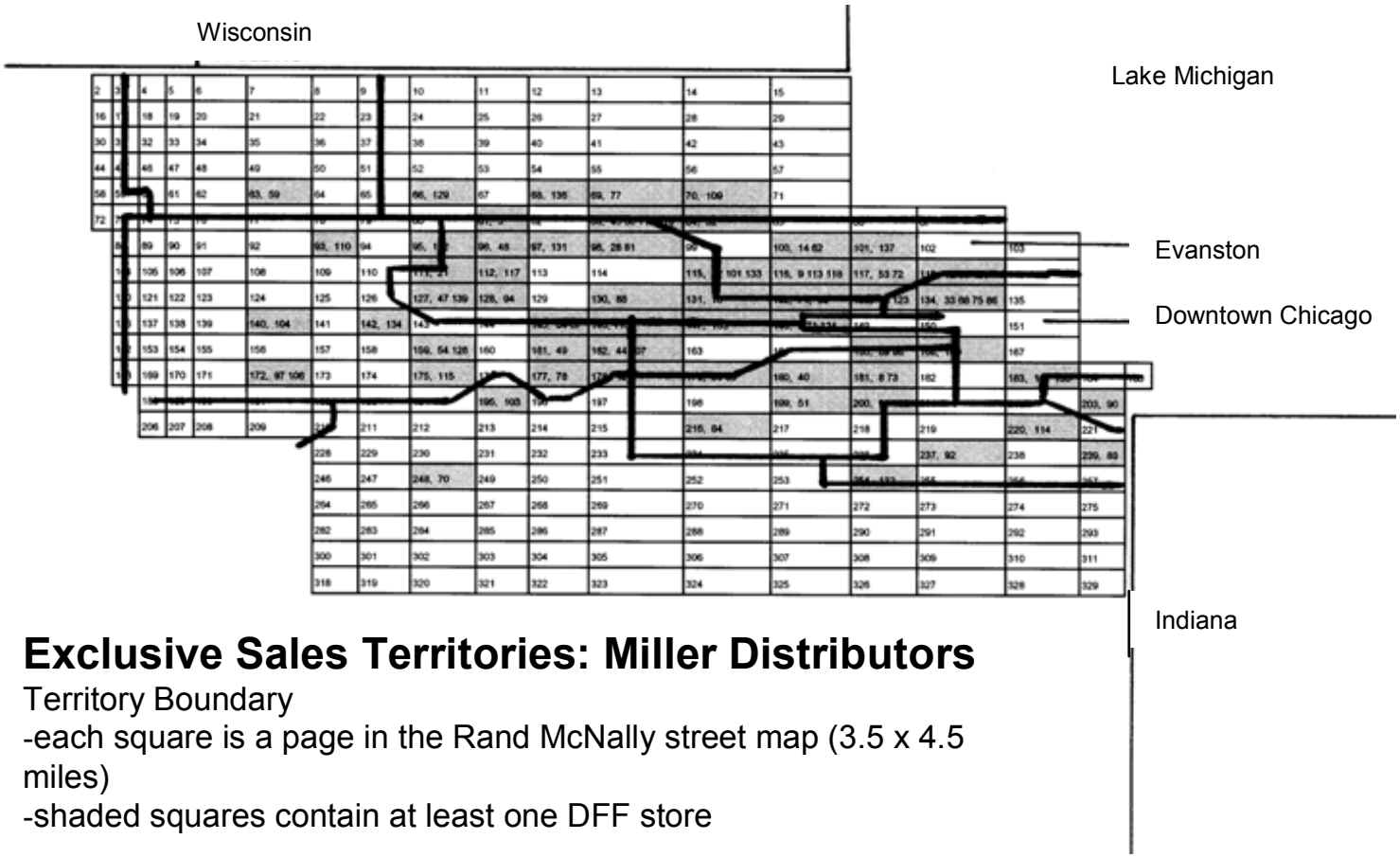
Note that one problem in the last example was that competition between the retailers initially resulted in too much competition downstream, so that firms could not afford to advertise as a vertically-integrated firm would choose to do.

This erodes the incentive to give service: i.e. likely too much intra-brand competition and too little inter-brand competition

One way around that: Exclusive Territories or "Territorial Dealerships"

Vertical markets

Exclusive territories: Miller and Chicago Beer Distribution



Exclusive Sales Territories: Miller Distributors

Territory Boundary

-each square is a page in the Rand McNally street map (3.5 x 4.5 miles)

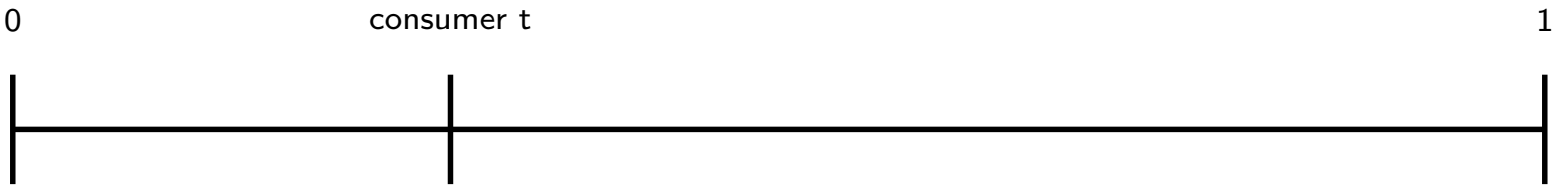
-shaded squares contain at least one DFF store

Vertical markets

Exclusive territories: Simple Model

Simple Model of Exclusive Territories:

- Consumers are uniformly distributed on the unit interval (so t lie to the left of consumer t, and $(1-t)$ lie to the right)



- Retailers are located at the ends of the interval (at 0 and 1). They are denoted R_L and R_R for left and right.
- To reach a retailers, consumers must pay a transport cost, t, equal to their distance from the retailer.

Vertical markets

Exclusive territories: Simple Model

- Consumers valuation for the good is:
  - V, if no service is provided
  - $V + \alpha F$ if service is provided by one retailer ($\alpha > 2$)
  - $V + 2\alpha F$ if service is provided by both retailers ($\alpha > 2$)
- assume $V > 2$

- Service is provided by a retailer at a fixed cost of F.

Vertical markets

Exclusive territories: Simple Model

Timing of the game (without exclusive territories)

1. Manufacturer sets a franchise fee equal to D, (there is no per-unit wholesale price).
2. Retailers choose their service levels. I.e. do they sink the fixed cost F
3. Retailers set retail prices P_L and P_R, observing the service level
4. Purchases are made and profits realised

Vertical markets

Exclusive territories: Simple Model

Steps in solving this style of model:

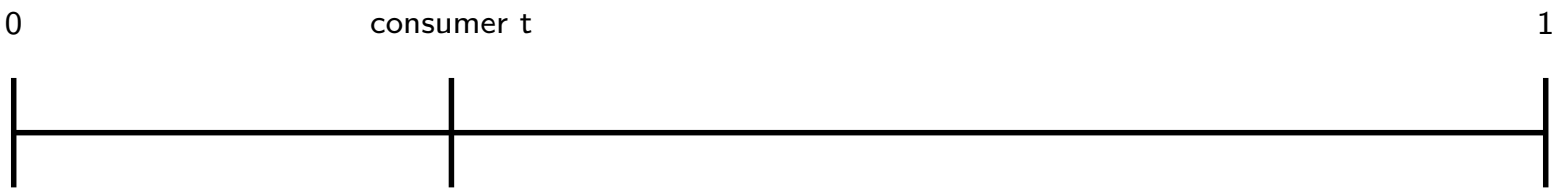
1. Work out what demand is for a given set of retail prices and service
2. Work out what profit is for a given set of retail prices, d and service
3. Solve for the nash equilibrium in retailer prices, given service
4. Examine what the incentives for providing service are
5. Look to see what d is in manufacturers best interest

Vertical markets

Exclusive territories: Simple Model

Step 1: Working out what demand looks like:

- Consumers are uniformly distributed on the unit interval (so t lie to the left of consumer t, and $(1-t)$ lie to the right)



- There will be some consumer, at some unknown point t, who is indifferent between R_L and R_R. For this consumer

$$V + \alpha F_L + \alpha F_R - P_L - t = V + \alpha F_L + \alpha F_R - P_R - (1-t)$$

Note, F_L and F_R will be equal to zero if no service. Solve for t to get:

$$t = \frac{P_R - P_L + 1}{2}$$

Vertical markets

Exclusive territories: Simple Model

Step 1: Working out what demand looks like:
So the demand for R_L is all consumer to the left of t

$$D_L(p_L, p_R) = t = \frac{p_R - p_L + 1}{2}$$

Demand for R_R is all consumers to the right of t, that is:

$$D_R(p_R, p_L) = (1 - t) = \frac{p_L - p_R + 1}{2}$$

Technical point: if prices are too far apart, one retailer will get the entire market.

Vertical markets

Exclusive territories: Simple Model

Step 2: Working out profits:

- if a retailer does not engage in service profits are $(i, j \in \{L, R\},\ i \neq j)$

$$\pi_i = \frac{1}{2}\left(p_j - p_i + 1\right) p_i - D$$

- if a retailer does engage in service profits are

$$\pi_i = \frac{1}{2}\left(p_j - p_i + 1\right) p_i - D - F$$

- in either case, FOC wrt p_i is

$$p_j - 2p_i + 1 = 0$$

$$\text{Hence, } p_i = \frac{(p_j + 1)}{2}$$

Vertical markets

Exclusive territories: Simple Model

Step 3: Work out the price equilibrium

- The best response function is

$$p_i = \frac{(p_j + 1)}{2}$$

- (note that the differentiation due to different locations removes the discontinuity in the classic bertrand model, hence we can use calculus...)
- If we look for the symmetric nash equilibrium in prices, set $p_i = p_j = p$ and get

$$p = 1$$

Vertical markets

Exclusive territories: Simple Model

Step 3: Work out the price equilibrium

- This means that profits are

$$\pi = \text{demand} \times (\text{price}) - D(-F \text{ if service provided})$$

- which, in symmetric price equilibrium is

$$\pi = \frac{1}{2} \times 1 - D(-F \text{ if service provided})$$

- so, if service is provided, profit is:

$$\pi^{service} = \frac{1}{2} - D - F$$

- and, if no service is provided, profit is:

$$\pi^{noservice} = \frac{1}{2} - D$$

Vertical markets

Exclusive territories: Simple Model

Step 4: Work out the incentives for service provision

- Clearly, no retailer has any incentive to provide service

Vertical markets

Exclusive territories: Simple Model

Step 5: What D will the manufacturer set?

- D will be set to extract all the surplus from the retailers, so $D = \frac{1}{2}$

Vertical markets

Exclusive territories: Simple Model

Can the manufacturer do better by adding vertical restraints?

- Often, yes. For instance, a problem is that no service is being done, despite the fact that it generates more benefit to consumers than it costs to do... If the manufacturer can capture this benefit then that is a chance to make more profit.
- The source of this lack of incentive to invest is that intra-brand competition means the retailers cannot internalise the benefit from it.
- One solution is to give each retailer a territory in which they are the exclusive seller. For instance, split the interval down the middle, so R_L get s all consumers $\in 0, \frac{1}{2}$ and R_R gets the rest.

Vertical markets

Exclusive territories: Simple Model

Can the manufacturer do better by adding vertical restraints?

- if these ET's are set, since $V > 2$ the best price for a dealer is $V + \alpha F_L + \alpha F_R - \frac{1}{2}$ - that is, to serve the entire exclusive market. (check by setting MR= MC).
- Hence, retailers can cover the cost of service, and the manufacturer can charge a higher franchise fee.

You should make sure you can derive these conclusions (it is required in a problem set). This illustrates how exclusive territories can help dampen intra-brand competition so as to enhance service.

Vertical markets

Vertical relations: Legal issues

Legal Issues:

There are a lot of ambiguities in legal treatment of vertical contracts. Key issue is that these restrictions can inhibit competition, but also enhance incentives for customer service.

- Until 1977 E. Territories were *per se* illegal under Sherman Act. US Supreme court changed standard to rule of reason in *Sylvania*
- Until 2007 RPM was *per se* under federal law, subject to many exceptions, US Supreme court changed standard to rule of reason in *Leegin*
- State law treatments vary, and worth having a lawyer examine contracts, especially if a firm has market power.

Vertical markets

Vertical relations: Legal issues

Anti-competitive issues

- vertical arrangements at times alleged to facilitate collusion (e.g. ET can look like market division, RPM can look like price fixing)
- can also be alleged to lead to exclusion of rivals (e.g. exclusivity contracts)