

# Vertical Relations

- So far we've been thinking of firms as selling their product to consumers.
- But it's just as often the case that firms sell their product to other firms.
- The relationship between a manufacturer and a retailer is very different.
- One reason is the demand faced by a manufacturer on the price it sets, but also other factors it does not directly control.
- The other reason is that retailers compete with each other.
- This is because retailers care about the wholesale price it pays as well as the wholesale price paid by others.

- This is because the whole sale price determines marginal cost and hence equilibrium profits.
- These reasons motivate the study of vertical relations between firms, usually one manufacturer and several retailers.
- We'll see why the manufacturer may want to establish contractual terms that differ from per-unit constant cost contracts.
- Consider a simple setting with a firm M and a firm R.
- Suppose the demand for the final product by R is  $D(p)$ .
- Regarding production by R, assume to produce one unit of output, R needs one unit of input.

- R has no costs except wholesale price  $w$ .
- M has constant marginal cost  $c$ .
- First consider the profit-maximizing solution when the two firms are vertically integrated.
- What the joint firm maximize is

$$\pi = (p - c)D(p)$$

- Now let the firms be vertically separated.
- Assume the contractual relation is the determination of  $w$ .

- Specifically,  $M$  determines  $w$  and  $R$  chooses how much to buy.
- $R$  will choose  $p$  to maximize  $(p - w)D(p)$ .
- To replicate the solution under vertical integration  $M$  would have to offer a wholesale price equal to marginal cost.
- But that would give  $M$  zero profit, so  $M$  would set  $w > c$ .
- But then  $R$  sets a price greater than  $p^M$ .
- Note that sum of the two firms profits is lower than the profit under integration.

- This is known as the double marginalization problem.
- Now suppose that in addition to setting a wholesale price, the manufacturer can set a fixed fee  $f$  that R has to pay if it wants to do business.
- The pair  $(f, w)$  will be a two-part tariff, where  $f$  here is referred to as a franchise fee.
- We will refer to this as a nonlinear contract.
- Suppose  $M$  sets  $w = c$  and

$$f = (p^M - c)D(p^M)$$

- This contract is efficient- it maximizes their joint profits.

- The retailer sets price at  $p^M$ , and receives gross profits of  $\pi^M$ .
- M receives 0 variable profit but recovers all profits through the franchise fee.
- This takes us back to the vertically integrated setting.
- Specifically, with nonlinear contracts, the optimal solutions are identical under vertical integration and vertical separation.
- This conclusion is very specific to some assumptions we will want to relax:
- One assumption is no competition at each stage- in fact with more retailers we won't be able to attain monopoly profits again.

- Another assumption we made was that of complete information- specifically that the manufacturer knew the costs of the retailer.
- We'll try to relax this as well, but it's also worth noting that there are alternative vertical restraints, such as MRP which can result in optimal solutions.