

## Vertical Mergers

Suppose that Grapefruit Computers makes a unique product that is distributed exclusively by the retailer Better Buy. Both firms act as monopolists to maximize their profits. Consumers have a demand curve at retail given by  $P=1000-Q$ . Grapefruit has constant marginal costs of \$100. Better Buy has marginal costs comprised of \$100 related to its sales activity (e.g. labor costs) and it also incurs the cost of purchasing its computers from the manufacturer.

- a) In the first part of this question we will investigate the profit maximizing behavior of the 2 firms:
- i) If Grapefruit sets a producer price of  $P_U$  for the retailer which the retailer takes as given, what is the retailer's marginal cost curve?

The retailer has marginal cost of  $P_U+100$  where  $P_U$  is the price per unit charged by the upstream manufacturer Grapefruit.

- ii) What is the profit maximizing quantity of sales for Better Buy, for any given price  $P_U$ ? How can we interpret the equation you have derived?

Start in the retail market and take the price  $P_U$  as given. From the point of view of the retailer the quantity will be chosen according to  $MR=MC$  implying a markup of price over input costs.

If demand is  $P=1000-Q$  then MR is  $P=1000-2Q$

Thus the profit maximization decision of the retailer is:

$$1000-2Q=100+ P_U$$

But note that this curve only determines the quantity of sales in terms of the producer price  $P_U$ . In other words this is precisely the DEMAND CURVE of the retailer from the point of view of the producer.

- iii) What is the marginal revenue curve for Grapefruit, and hence the profit maximizing quantity of output?

$P_U = 900-2Q$  is the demand curve from above

Since we also have monopoly power in this market the producer sets its price by considering its marginal revenue curve – this is the DOUBLE MARGINALIZATION

$$MR_U = 900 - 4Q$$

Solving Grapefruit's problem:

$$MR_U = 900 - 4Q = MC = 100$$

$$800 = 4Q$$

$$Q = 200$$

- iv) What are the producer and retail price of the computer, and hence the profits of each firm?

For the producer price we go to the demand curve for the producers;

$$P_U = 900 - 2Q = 500$$

So the producer marks up the price by \$400 over costs.

In the final goods market the retail price is:

$$P = 1000 - Q = 800$$

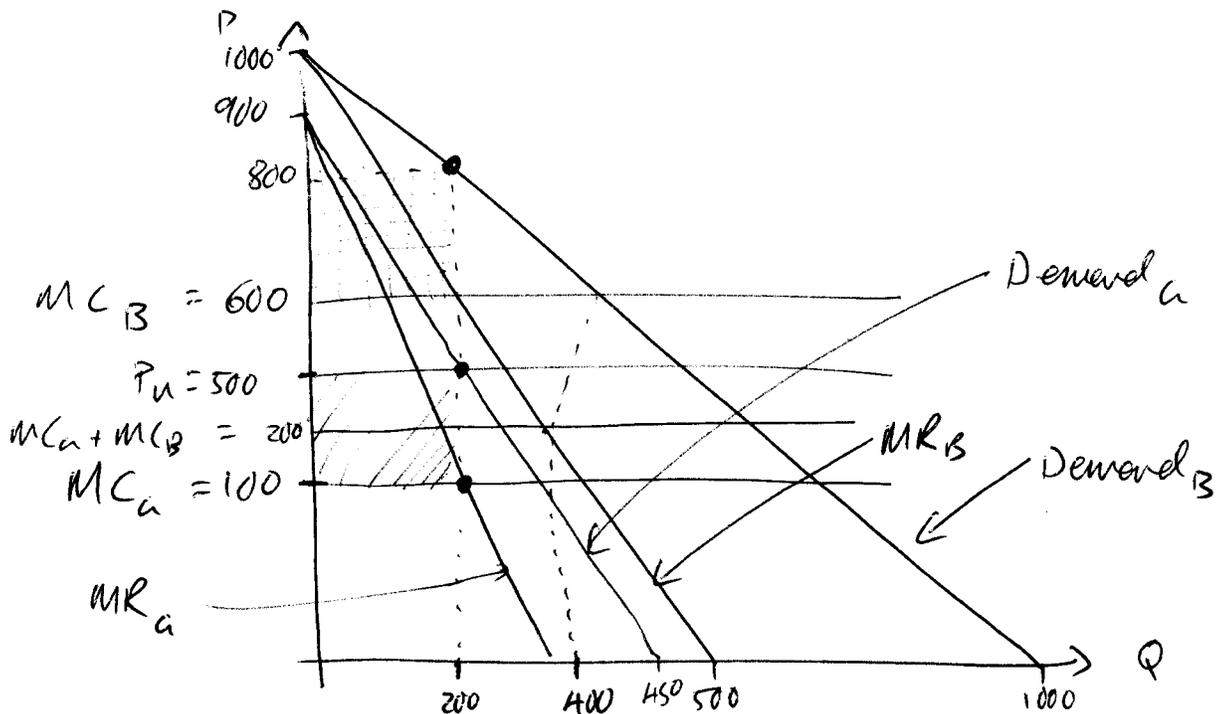
So the retailer introduces another markup of \$200 over costs of \$600.

We can calculate the profit of the two firms:

Grapefruit profit =  $200 \times 400 = 80000$



Better Buy profit =  $200 \times 200 = 40000$



- b) Now we will proceed to examine whether this vertical structure is maximizing its profits.
- i) Suppose that Grapefruit could sell its computers directly to consumers, incurring the same retail costs as Better Buy in part a). What would be the profit maximizing price and quantity now?

If the computers could be sold directly the full marginal cost would be \$200. Grapefruit would act as a profit maximizing monopolist and set

$$MR=1000-2Q=200$$

$$Q=400.$$

The price is given by the demand curve, so  $P=1000-400=600$

- ii) What are the profits of the firm?

$$\text{Profits are } 400 \times (600 - 200) = 160,000$$

- iii) If Grapefruit cannot create its own retail network, but has to rely on that of Better Buy can it create value by buying out the retailer?

The profits of the vertical structure are larger when there is only a single firm making the pricing decisions. In particular the total producer surplus created by the structure is 160,000 compared to  $80,000 + 40,000 = 120,000$  in the original scenario. A merger here would make sense. Since 40,000 value can be created, Grapefruit can offer Better Buy anything from 40,000 to 80,000 – any offer in this range is a Pareto improvement – both firms benefit.

In fact either firm could buy the other:

	Total Profit	Profit Grapefruit	Profit Better Buy
Separate	120,000	80,000	40,000
Grapefruit Purchases for $40,000 < P < 80,000$	160,000	$160,000 - P > 80,000$	$P > 40,000$
Better Buy Purchases for $80,000 < P < 120,000$	160,000	$P > 80,000$	$160,000 - P > 40,000$

It does not make any difference from an efficiency perspective which firm buys the other – the same value is created in each case. There is a range of selling prices that would leave both firms better off, reflecting precisely the fact that there is a gain from trade. Of course the actual selling price will determine how that gain from trade is divided between the two firms.

We can think of this in terms of the Coase theorem that we discussed in the section on externalities – with a small number of agents and a situation with an externality, we would expect that negotiation between the parties would come up with a way of internalizing the externality. As is usual with the Coase theorem, there can be many solutions – they all reach the efficient outcome but can differ in terms of the distribution of surplus.

- iv) What is the economic rationale for the merger? Why is the vertical structure inefficient and how does the merger create value?

The vertical structure is inefficient because of the **DOUBLE MARGINALIZATION**. There is an externality at work here. The retailer takes the producer price as given and maximizes its profits. As it is a monopolist it does so by restricting the quantity of sales. Although this is profit maximizing for Better Buy, it does not take into account that the restriction of sales reduces the profits of Grapefruit, since Grapefruit is also earning a margin on its sales. This negative externality is not taken into account in the pricing at retail level, and since negative externalities are done to excess there is too little output sold relative to the fully profit maximizing arrangement. The merger, by rationalizing the decision making, essentially removing the intermediate pricing step allows this externality to be fully internalized so the efficient outcome for the firms together can be reached.

We can see that the inefficiency is related to the monopoly pricing by comparing the outcome if the retail sector were competitive.

If retail is competitive then

$$1000 - Q = 100 + P_U$$

so the demand curve upstream is:

$$P_U = 900 - Q$$

$$MR_U = 900 - 2Q$$

And profit maximization implies that

$900 - 2Q = 100$  so that  $Q = 400$  – the profit maximizing quantity for the structure as a whole.

Equivalently, suppose the computer manufacturer market is competitive so that Grapefruit cannot charge a mark-up. The marginal costs of Better Buy are \$200 and the MR curve from the market demand is  $P = 1000 - 2Q$ .

Profit Maximization again gives  $1000 - 2Q = 200$  and  $Q = 400$  the efficient quantity of output.

- c) Thinking about welfare more generally, the merger allows the firms to exploit their monopoly power more effectively. Does this come at the cost of consumer surplus? Should the merger be permitted on the grounds of economic efficiency?

What are the welfare implications of this merger? Compared to perfect competition, consumers always suffer when firms get to exploit their monopoly power. However in the case of double marginalization consumers also gain. The reason is that prices are higher and quantities lower in the non-integrated arrangement – the non-integrated firms restrict output beyond that which a single monopolist would choose – profits actually increase as the firms increase output closer towards the competitive level.

This illustrates an important difference between horizontal and vertical mergers. Horizontal mergers will often reduce competition and have negative implications for consumers. Vertical mergers can rationalize the production structure to the benefit of both producers and consumers.