Chapter 16

Vertical Integration and Vertical Relationships

Chapter 3 explored the boundaries of the firm. Recall that firms often perform functions internally rather than using the market in an attempt to reduce transactions costs. It is important to bear in mind as you read this chapter that most vertical integration aimed at reducing transactions costs will have positive efficiency and welfare effects.

This chapter examines the theoretical effects of vertical integration and vertical relationships between independent firms, with an emphasis on the conduct and performance implications of vertical relationships. A balancing act is taking place in this chapter. In the first half of the chapter, we show that vertical integration and vertical relationships have a positive economic impact because they solve several potential economic problems. The second half of the chapter examines the potential problems associated with vertical integration and vertical relationships. This balancing act is a delicate one and should be taken seriously.

Vertical Relationships as a Solution to Economic Problems

THE PROBLEM OF DOUBLE MARGINALIZATION

Consider the simplest possible vertical structure, in which an upstream wholesaler, perhaps a gasoline jobber, sells to a downstream retailer, say, a gasoline retailer, and the retailer simply turns around and sells the product to the final consumer. To simplify this model, it is common to assume that the transactions costs of transferring and delivering the good from one stage to another are zero. This implies that if a competitive gasoline retailer purchases a gallon of gasoline at a wholesale price $P_W$ equal to $1.50$, the retailer will sell the gallon to consumers at a retail price $P_R$ equal to $1.50$, that is, $P_W = MCR = P_R = 1.50$.

Any of the following situations is theoretically possible:

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<th>Case</th>
<th>Wholesaler is:</th>
<th>Retailer is:</th>
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<tr>
<td>A</td>
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Under which, if any, of these four competitive environments would vertical integration affect price and profits? In case A, both the wholesaler and retailer operate in perfectly competitive markets; price equals marginal cost everywhere, and vertical integration would have no impact on price.

Figure 16.1 depicts case B with a competitive wholesaler and a monopolist retailer. The downward sloping demand curve, $D_R$, and marginal revenue curve, $MR_R$, represent final retail consumer demand and marginal revenue, respectively. The $MC_W$ curve represents the marginal cost of the product to the wholesalers (for example, the wholesalers' cost per gallon of gasoline). With case B the competitive wholesalers must charge a price equal to marginal cost, so $P_W = MC_W$. The monopolist retailer then takes that price as its marginal cost and charges the profit-maximizing price $P_R$ to consumers. Note that $P_R$ is the joint profit-maximizing price so that a profit-maximizing vertically integrated firm would also charge $P_R$. In this case the outcome is the same whether or not there is vertical integration.

![Figure 16.1](https://example.com/figure16.1.png)

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Figure 16.2 Vertical integration: monopolist wholesaler, competitive retailers.

Figure 16.2 depicts case C with a monopolist wholesaler and a competitive retailer. The downward sloping retailer demand curve, $D_R$, is also the demand curve $D_w$ for the monopolist wholesaler, because the quantity along $D_R$ represents the quantity of the good that retailers will sell at any given wholesale price. The marginal revenue curve for the monopolist wholesaler is therefore $MR_w$. The $MC_w$ curve again represents the marginal cost of the product to the wholesaler. With case C the monopolist wholesaler sets $MC_w = MR_w$ and charges $P_w$. The wholesale price $P_w$ becomes the competitive retailers' marginal cost, so $P_w = MC_R = P_R$. Once again, as in case B, $P_R$ is the price that a profit-maximizing vertically integrated firm would charge. Thus, in case C, vertical integration again has no effect on output or price.

Now consider case D. Surely with monopoly in both vertical stages, vertical integration must have some effect on price, and it does. Consider Figure 16.3. The key distinction between Figure 16.3 and Figures 16.1 and 16.2 is that the marginal revenue curve of the retailer is now the demand curve for the wholesaler. The wholesaler knows that because the retailer will restrict output according to its marginal revenue curve $MR_R$, the wholesaler's demand at any given wholesale price will be indicated by the $MR_R$ curve. If the wholesaler's demand is $D_w = MR_R$, then the wholesaler's marginal revenue curve becomes $MR_w$. The profit-maximizing wholesaler now sets $MC_w = MR_w$ and charges price $P_w$. The retailer then takes $P_w$ as its marginal cost, sets $MC_R = MR_R$, and charges a price of $P_R$. The wholesaler earns an economic profit equal to $P_wDF_G$. The retailer earns a profit of $P_RBF_G$ and consumer surplus equals triangle $ABP_R$. Combined profits are equal to area $P_RBF_G$.

If the two monopolists vertically integrated, the firm would maximize profits by considering the internally evaluated marginal cost of the wholesale product to be $MC_w$, not $P_w$. As a result the integrated firm would charge a retail price of $P_w$, joint profits would be maximized at $P_wC_EG$, and consumer surplus would equal triangle $ACP_w$. Vertical integration is better for the two monopolists because area $P_wC_EG$ is larger than area $P_RBF_G$ and better for consumers because area $ACP_w$ is larger than area $ABP_R$. In this case, public policy should do everything possible to encourage vertical integration.

This conclusion is often associated with the Chicago school of economics, even though the model was developed by Joseph Spengler of Duke University. Because of double marginalization, each successive stage of monopoly causes a greater price distortion compared with a vertically integrated firm. If the above logic is correct, then in cases A, B, and C, vertical integration has no welfare implications, and in case D, vertical integration increases output, lowers price, and improves economic welfare. Therefore, public policy should encourage as much vertical integration as possible where successive market power exists.

**Alternative Methods of Achieving Joint Profit Maximization**

The Spengler model provides a valuable framework for understanding why certain types of vertical restraints are common. Vertical restraints refer to a variety of methods used by manufacturers to limit the ways in which retailers can market
their product. Two of the most common vertical restraints are franchise fees, whereby a manufacturer requires its retailers to pay a fixed fee for the right to sell the product, and resale price maintenance agreements, whereby the manufacturer sets a minimum or maximum retail price. McDonald’s, for example, requires its franchises to pay a franchise fee for the right to open a McDonald’s restaurant. For many years Levi Strauss required the retailers of its jeans to abide by a resale price maintenance agreement that set a minimum permissible sale price for its jeans. Suppose that in the two-monopolist case in Figure 16.3 the wholesaler charges the retailer a price per unit equal to $MC_w$ but also charges a fixed franchise fee equal to area $P_w \cdot CEG$. The retailer will then charge the joint profit-maximizing price of $P_w$ but earn only a normal profit because the entire area $P_w \cdot CEG$ is transferred to the wholesaler. The franchise fee eliminates the problem of “double marginalization” and improves welfare compared with successive stages of monopoly.

A resale price maintenance agreement could also improve welfare. Suppose the wholesaler sells the good to the retailer at some price between $MC_w$ and $P_w$ in Figure 16.3 and then sets a maximum retail price of $P_w$. Again the joint profit-maximizing result will be achieved. Profits will be divided according to the wholesale price. If the wholesale price is set close to $MC_w$, the retailer makes the bulk of the profit, whereas if the wholesale price is set close to $P_w$, the wholesaler makes most of the profit.

### The Problem of Insufficient Promotional Services

In addition to simply carrying a selection of products, retailers provide pre-sale services to consumers. In fact, in some instances consumers select products primarily on the basis of the quality of pre-sale service. Stride Rite controls a large share of the “high-quality baby shoes” market because it is famous for having retailers who know how to fit baby shoes. Suppose that a monopolist wholesaler sells a product through a series of competitive independent retailers. The situation is like case C above with a monopoly at the wholesale level and a competitive retail market.

The demand for this product is a function not only of price but also of the pre-sale services provided by retailers. Demand can be represented as:

$$Q = D(P, S),$$

where the quantity demanded, $Q$, increases with either a decrease in price, $P$, or an increase in pre-sale services per unit of output provided by retailers, $S$.

The situation is identical to that depicted in Figure 16.2. Competitive retailers have little or no incentive to supply services in this case because no matter what level of service they provide, competitive retailers will earn zero economic profit. In fact, if one retailer tried to provide greater pre-sale services, it would have higher costs and be driven out of the market. Suppose that initially all retailers provide no service, $S = 0$. The situation is shown in Figure 16.4, where $Q = D(P, 0)$ because $S = 0$. The monopolist wholesaler’s profits are indicated by the shaded red area. This is clearly not an optimal situation for the monopolist because an increase in $S$ shifts the demand curve to the right and increases the monopolist’s profits by $(P_w - MC_w)\Delta Q$.

There must be some combination of price, call it $P^*$, and services, call it $S^*$, that maximizes the wholesaler’s profits. In Figure 16.5 it is assumed that $D(P, S)$ is the demand curve that maximizes the wholesaler’s profits. Suppose the monopolist wholesaler charged retailers a price $P_w > MC_w$, and in addition used a resale price maintenance agreement to require retailers to charge a price $P^*$. If $P^* - P_w = S^*$, then the combination of a wholesale price $P_w$ above marginal cost and a resale price maintenance (RPM) price set at a maximum price of $P^*$ would achieve the joint profit-maximizing result. That combination of policies forces the competitive retailers to provide services, $S^*$, costing $(P^* - P_w)S$ per unit of sales so that retail profits are driven down to zero.

To understand why the retailers have an incentive to provide services, consider the initial imposition of such a policy in place of a policy of charging price

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*If one retailer tries to provide services of value to consumers and raises price to cover the costs of these services, then consumers can use the services and buy the good at a lower price from a “no-service,” low-price retailer. This is an important case of free riding by the no-service retailers, who take advantage of the services provided by the high-service retailer but keep their prices low.*
Figure 16.5  Wholesaler's profits if retailers provide the optimal level of service, S*.

$P_W$ without RPM. Figure 16.5 shows that the imposition of RPM at price $P^*$ initially results in excess economic profits for the retailers because with no service (the initial situation) $P^* > P_W = MC_R$. The excess profits would encourage established and new retailers to compete by providing better service. The increased provision of services would increase demand and force incumbent competitive retailers to also provide services. In long-run equilibrium all retailers must provide the same level of services and earn zero economic profit.

Consider the welfare implication of the imposition of RPM. In Figure 16.6 combined consumer and producer surplus with no service equals areas B + C + E. With RPM consumer surplus equals areas A + B, producer surplus equals areas E + F, and areas C + D represent the cost of services provided by the retailers. RPM increases consumer surplus by area A, but decreases it by area C; producer surplus increases by area F. It follows that the net welfare effect is ambiguous because we do not know the size of areas A + F relative to area C; it will be different for every case. If (areas A + F) > (area C), then welfare increases; and if (areas A + F) < (area C), then welfare decreases.

In Figure 16.6 welfare increases because (A + F) > C. Although this is one possible outcome, Figure 16.7 shows an example in which welfare decreases because (A + F) < C. Bork has argued that Figure 16.6 is the more likely outcome; in his words, RPM is a "means of increasing distributive efficiency and should be permitted on grounds of efficient resource allocation." Others have suggested, however, that Figure 16.7 is the more likely outcome because "demand is augmented more by extra service to those with low reservation prices than those who would buy the product even at much higher prices"; as a result, the demand curve is likely to shift upward far less for consumers with high reservation prices than for consumers with low reservation prices, which is exactly what happens in Figure 16.7. The only definite conclusion is that there is no conclusion: RPM agreements aimed at increasing pre-sale services may have either net positive or net negative welfare effects.

THE PROBLEM OF INPUT SUBSTITUTION

In addition to solving the problems of double marginalization and insufficient promotional services, vertical integration and vertical restraints can solve problems associated with inefficient input substitution. Suppose that a monopolist produces good X, using only two inputs, input M and input C. Input M is produced by another monopolist, and input C is produced in a perfectly competitive market. Because the analysis is complex, it is left to an end-of-chapter appendix to show that in the absence of vertical integration or vertical restraints, the monopolist producer of good X would use an inefficient combination of inputs, using "too much" of input C and "too little" of input M, to produce any given output of good X. Vertical integration or vertical restraints can solve this problem.

Thus far most vertical integration and restraints appear to improve economic welfare. The analysis, however, has ignored the possible effects of vertical integration and vertical restraints on market structure and conduct. The next section considers these potential problems.
The Competitive Effects of Vertical Relationships

RESALE PRICE MAINTENANCE AGREEMENTS

Previously, we showed that RPM agreements that fix maximum price levels are a possible welfare-improving method of dealing with the problem of double marginalization. Recall from Figure 16.3 that if the wholesaler sells the good to the retailer at any price between $MC_W$ and $P_W$, the joint profit-maximizing result will be achieved, and welfare will be increased. In this case, RPM is being used to set maximum resale prices, not minimum resale prices. There is little doubt that such maximum resale price fixing improves economic efficiency, even though in the United States the courts have generally frowned on the fixing of maximum prices as a violation of the antitrust laws.

Maximum resale prices have been used in many industries, particularly those in which the product is not physically transformed as it moves from manufacturer to distributor to retailer. Examples include television sets, refrigerators, automobiles, tires, electric typewriters, newspapers, and stereo equipment. Consider the example of a newspaper publisher with a local monopoly that gives each of its delivery workers an exclusive territory. Each delivery worker has a monopoly in her local territory and, in the absence of a maximum resale price, could exploit her monopoly power. This results in a classic potential double-marginalization problem. In terms of Figure 16.3, the delivery worker wants to set $P = P_k$. If the publisher sets a maximum resale price at $P_W$, the publisher earns greater profits and improves economic welfare.

Most RPM agreements require the setting of minimum rather than maximum resale prices. Many studies have shown that, except in rare cases, these RPM agreements result in higher retail prices and, therefore, lower sales for the manufacturer. It is somewhat surprising that manufacturers would ever set minimum resale prices: once a manufacturer sets a product's wholesale price, it would normally be in the manufacturer's interest to increase sales by having the product sold at the lowest possible retail price. If RPM generally does not benefit manufacturers, why has it been so commonly used?

Four major arguments have been advanced to explain the adoption of RPM. First, RPM may be the result of collusion among retailers to keep prices high. According to this argument, the most important reason for RPM's popularity has been the desire of small retailers to compete with large discount stores. Historically, small retailers have taken advantage of the fact that RPM permits them to set their own prices above marginal cost, thereby allowing them to raise the prices of goods to customers without being cut. RPM prevents retailers from competitive pricing. Second, resale price maintenance might make tacit collusion among manufacturers easier to maintain. Third, RPM might prevent retailers from selling high-quality products at low prices or as "loss leaders." According to this theory, if a high-quality product is consistently sold at a low price, consumers will begin to think of the product as a low-quality product, and this will hurt the manufacturer in the long run. Finally, RPM has been justified by the argument that some products require high-quality pre-sale service from retailers, and only RPM or vertical integration can ensure the provision of such services. We consider each of these arguments briefly.

RPM Cartels

RPM agreements may result from collusion among retailers to keep prices high. Suppose, for example, that a group of competitive department stores and drug stores purchases perfume from perfume oligopolists. If the department and drug store owners meet at a trade convention and convince all of the perfume manufacturers to set minimum suggested retail prices, the price of perfume can be set above marginal cost.

In this example, RPM is being used by the department and drug stores as an effective method of solving the prisoner's dilemma. Price-cutting retailers can be easily identified and punished. Identification will surely discourage the retailers, and punishment comes in the form of a cutoff of supplies to price cutters. If all the retailers and all the perfume oligopolists abide by the agreement, prices can be increased to the monopoly level and profits divided between the manufacturers and the retailers by charging a wholesale price between the marginal cost of producing the perfume and the profit-maximizing retail price. In
this case the vertical restraint is nothing more than an effective method of collusion, and RPM reduces welfare.

One might wonder why the perfume oligopolists do not vertically integrate into retailing, charge the joint profit-maximizing retail price, and capture all of the monopoly profits for themselves. The problem with this solution is that it requires the development of a huge retailing network capable of covering the entire country just to sell perfume. This would be extremely costly, and it is hard to imagine any manufacturer setting up such a national network.

There is reason to believe that few such retailer cartels could earn excess profits in the long run. Entry into retailing is typically easy. Even if the RPM results in short-run excess profits, in the long run entry should reduce the retailers' profits by reducing each retailer's volume and increasing the costs of merchandising sales efforts aimed at gaining an advantage over competitors. This probably explains why evidence suggests that relatively few RPM agreements developed primarily because of retailer pressures applied to manufacturers.  

**Facilitating Manufacturers' Cartels**

Resale price maintenance might make it easier for manufacturers to maintain cartel prices. If retail prices are fixed, a manufacturer will have little incentive to reduce prices. Because the price reductions cannot be passed on to consumers, the cuts are likely to have a limited effect on the chiseler's market share.

Empirical evidence is not supportive of this theory. Overstreet found very few industries in which RPM was common and in which concentration was high enough to make a price-fixing conspiracy likely to survive. Telser did find that the American light bulb industry may have used RPM to foster collusion in the early twentieth century, but there are few other documented cases. Overall, facilitating manufacturers' collusion does not appear to explain many RPM agreements.

**The Establishment of a High-Quality Image**

Manufacturers have argued that RPM prevents retailers from damaging their products' images by selling them at low prices or as "loss leaders." Both Levi jeans and Izod alligator shirts may have been victims of this phenomenon when they moved away from RPM. Initially Levi's sales increased, but during the early 1980s it lost significant market share to designer jeans such as Gloria Vanderbilt, Ralph Lauren, and Calvin Klein. Similarly, Izod's image and appeal declined as the shirts became widely available.

The welfare implications of the high-quality defense are difficult to assess. If I purchase an alligator shirt, it increases my utility. But if my purchase of an alligator shirt simultaneously decreases your utility, what are the net welfare implications of my purchase? Such circumstances call into question a basic conclusion about the efficiency of markets, because it no longer follows that increased consumer surplus. Furthermore, it is important to recognize other ways of dealing with this problem. The manufacturer could simply raise the price of the product, thereby creating an incentive for retailers to charge more. If, for example, Izod increases the price of alligator shirts, retailers almost certainly would charge higher prices. In conclusion, RPM seems like an awkward and indirect method of maintaining a high-quality image.

**Ensure Dealer Pre-sale Services**

RPM has been justified by the argument that some products require high-quality pre-sale service from the retailer, and only RPM can ensure such services. It is certainly true that some products require high-quality pre-sale service from the retailer. For example, high-quality computer manufacturers might require high-quality pre-sale service from their dealers. By imposing RPM on their computer retailers, manufacturers could ensure that the dealers do not compete based on price but, instead, would compete by attempting to provide better service. In the absence of RPM, some computer dealers would provide good, but costly, service and charge high prices, and other dealers would provide little or no service and charge low prices. Consumers could then shop around at the high-priced, good-service dealers, but purchase their computers at the low-priced dealers. The low-priced dealers would then obtain a free ride on the services provided by the high-priced dealers, and over time, the high-priced, good-service dealers might be eliminated from the market.

The prevention of a significant free-rider problem is the most convincing economic justification for RPM; however, relatively few goods actually require good pre-sale service. The argument may make sense for items such as automobiles, computers, audio and video equipment, and bicycles, for which in-store pre-sale services are important; it's difficult to believe that Levi's jeans, Izod shirts, Florsheim shoes, or Russell Stover candies, all items commonly sold under RPM, require the provision of good pre-sale service.

Despite the arguments that RPM rarely makes sense for manufacturers, firms continue to use RPM. The continued use of the practice suggests that benefits exist for at least some manufacturers. Perhaps there is a difference between the short-run and long-run effects of RPM. Elimination of RPM may result in short-run gains to manufacturers as more consumers purchase the good, but in the long run the elimination of RPM may result in a serious negative impact on the quality reputation of the good. Both Levi's jeans and Izod sportswear now have a much less posh reputation than they did under RPM pricing policies.

One final point is that American retailing has become more competitive in the past two decades with the advent of large discount department stores, large outlet malls, and large retail chains such as The Gap and The Limited. With this changing market structure, the potential negative impacts of RPM have declined because manufacturers find it increasingly difficult to refuse to deal with stores in all of these various retail outlets.

*The argument does not hold much weight for post-sale services, because a higher-quality service dealership should be able to charge higher prices for post-sale service with little fear of losing significant business to low-quality dealerships.*
In Chapter 22, the antitrust treatment of RPM is considered in detail. We delay the analysis of specific cases until then.

**STRATEGIC USES OF VERTICAL INTEGRATION**

Recall from Chapter 11 that entry may be prevented if incumbents are able to raise their rivals' costs. Vertical integration and restraints may be used to raise rivals' costs in a number of ways. Under exclusive dealing arrangements, a retailer agrees to carry only one manufacturer's products. Any argument in favor of exclusive dealing revolves around the provision of pre-sale services. In the absence of exclusive dealing, a manufacturer may supply a retailer with promotional services, such as advertising and employee training, that increase the flow of consumer traffic into the retail store only to have the retailer, who carries many brands, switch the consumer to a different brand. Classic examples of exclusive dealing include automobile dealerships, Electrolux dealers, and bicycle shops.

Now consider the potential negative effects of exclusive dealing. Under an exclusive dealing arrangement, a manufacturer with market power may be able to prevent entry while still charging a price above the potential entrant's average cost. Consider a monopolist who produces "ABC" brand widgets at MC = AC = 100 and sells the widgets at a wholesale price P = 125. Assume a potential entrant can produce a similar widget for the same MC = AC = 100. To enter effectively, the potential entrant must find dealers willing to take its product. If the monopolist makes it a clear and overtly stated policy that any dealer that accepts another firm's widgets will be immediately cut off from its supply of "ABC" widgets, entry can be deterred while the price of "ABC" widgets can be maintained at a level above average cost. To make the threat credible, any dealer that accepts competitors' widgets must be cut off quickly by the monopolist.

According to Comanor and Frech, this is exactly what happened in the United States market for silicone sealants in the 1970s. Rhodia attempted to enter the market by selling at a much lower price than the dominant firm, General Electric. GE controlled a 75 percent market share and sold its sealants through exclusive dealings. When one of GE's largest customers, C.R. Laurence, began to market Rhodia's sealants, GE responded immediately by dropping Laurence from its dealership list. As a result, no other GE dealers marketed Rhodia's sealants and further erosion of GE's market share was prevented.

Vertical integration also may be used strategically to raise the price of inputs for competitors. Suppose that a dominant manufacturer is vertically integrated into an important input and fringe manufacturers are not. Because of economies of scale, the integrated manufacturer can produce the input at a lower cost than it can buy it from small unincorporated input manufacturers. The integrated manufacturer can then purchase enough of the input from independent suppliers to increase the price of the input. This will increase its rivals' costs because the unincorporated rivals must purchase the input from independent suppliers at a higher price.

In this scenario the integrated firm's average cost will increase in proportion to its purchase of the input. If, for example, purchases by the integrated manufacturer increase the input price by $1.00 per unit, and the integrated manufacturer produces 75 percent of the input internally and purchases 25 percent from unincorporated input suppliers, the integrated manufacturer's average cost will increase by (0.25) x ($1.00) = $0.25. For the unincorporated fringe manufacturers, however, average costs would increase by the full $1.00 per unit, and the fringe supply would decrease.

Because this policy raises the integrated firm's costs, profits are reduced. The policy makes sense, therefore, only if the reduction in profits caused by the higher input cost is more than offset by an increase in profits that will result from a reduction in the supply of the fringe firms. As the fringe manufacturers reduce output, the integrated firm's output should increase, and this increase in output should result in increased profits. In this case the effect on welfare is unambiguously negative because both costs and price increase.

In other cases a vertically integrated dominant manufacturer of a final good and an important input may be able to strategically create a price squeeze on competitors by simultaneously increasing the price of the input and decreasing the price of the finished good. It has been argued, for example, that before 1930 Alcoa increased the price of aluminum ingots (the input) while simultaneously reducing the price of aluminum sheets and fabricated products. Because Alcoa had a monopoly on ingots, this policy resulted in serious problems for unincorporated fabricators, such as Reynolds. Reynolds saw its input prices rising and its fabricated goods' prices falling. Alcoa was able to weather the reduction in profits on fabricated goods because its profits in the ingot market increased. Furthermore, observation of Alcoa's price-squeezing behavior would undoubtedly serve as a strategic reminder to any potential entrants into the fabricating business.

Alcoa's behavior also indicated that vertical integration can be used as an enabling device for price discrimination. In the 1930s and 1940s aluminum was used primarily to produce five manufactured goods: (1) iron and steel (aluminum was an important alloy); (2) cooking utensils; (3) electric cable; (4) automobile parts; and (5) aircraft. Because the availability of substitutes varied widely from one use to another, the elasticity of demand for aluminum varied as well. For example, the demand for aluminum in cooking utensils, for which many potential substitute inputs were available, was much more elastic than the demand for aluminum in aircraft, for which there were no good substitutes. Profit maximization required Alcoa to charge a higher price to aircraft manufacturers than to cooking utensil manufacturers. According to Perry, the demand for aluminum in cooking utensils, electric cable, and automobile parts was relatively elastic, and the demand for aluminum as an iron and steel alloy and in aircraft manufacturing was much more inelastic.

In the absence of vertical integration, Alcoa would be forced to charge one price to all fabricators because otherwise one buyer could transfer the aluminum to another. If, for example, Alcoa attempted to charge aircraft manufacturers a higher price than utensil manufacturers for the same aluminum sheets, arbitrage would be possible between the aircraft and utensil manufacturers; the utensil manufacturer could purchase the aluminum at the low price and resell it to the aircraft manufacturer for a profit.

If Alcoa vertically integrated into utensils, however, it could increase the price to aircraft manufacturers without having to be concerned about the transfer
of the good from one buyer to another. Perry has shown that in the early part of the twentieth century Alcoa behaved in just this manner.25 Alcoa vertically integrated into the three markets with more elastic demands: cooking utensils, electric cables, and automobile parts. This enabled Alcoa to keep the prices it charged to the iron and steel and aircraft industries high. Vertical integration, therefore, enabled Alcoa to practice price discrimination.

RAISING THE CAPITAL BARRIER TO ENTRY

In the preceding section we observed that vertical integration can facilitate the use of certain types of strategic behavior to discourage entry. Recall from Chapter 5 that capital barriers present a formidable barrier to entry in the presence of imperfect capital markets. The existence of significant vertical integration may make it necessary to enter an industry at more than one vertical stage, thereby increasing capital barriers to entry. In aluminum, for example, Alcoa controlled much of the world’s bauxite ore supply, the United States’ ingot capacity, and a good deal of fabrication capacity. As a result, to compete effectively against Alcoa, it was probably necessary to enter more than one vertical stage of production. This increased the capital barrier to entry tremendously and made it impossible for all but a handful of firms to enter.

COLLUSION AND VERTICAL INTEGRATION

The relationship between vertical integration and the likelihood of effective collusion has troubled economists for many years.26 Recall from Chapter 8 that two of the most significant factors affecting the probability of effective collusion are the number of firms and concentration. Increased vertical integration is likely to decrease the number of firms in a market and increase concentration. Consider Figure 16.8. In the absence of vertical integration, this industry is characterized by four upstream manufacturers and twenty downstream retailers. Collusion among the retailers will be difficult because twenty is a large number of firms and each firm controls a relatively small 5 percent of the market. Suppose that the manufacturers engage in a vertical merger blitz that transforms the industry struc-

![Figure 16.8 An industry with four manufacturers and twenty retailers without vertical integration.](image)

![Figure 16.9 An industry with four manufacturers and twenty retailers and significant vertical integration.](image)

ture into that in Figure 16.9. Now only eight retailers remain, and the four-firm concentration ratio has increased from 16 to 84. Given the structure of Figure 16.9 effective collusion is more likely to occur.

Vertical integration has been shown to help foster collusion in industries as diverse as textiles and pharmaceuticals.27 Costello found that the key to suppressing price competition in the introduction of new antibiotics in the late 1940s and early 1950s was a combination of patent protection and forward vertical integration into packaging.28 Telse has suggested that GE and Westinghouse marketed light bulbs only on consignment to eliminate any attempt by the retailers to bargain for better terms with manufacturers.29 Further evidence is provided by Caves and Porter, who found that increased vertical integration resulted in greater stability of market shares in an industry.30

FORECLOSURE*

As noted previously, foreclosure occurs when downstream firms (such as retailers) have difficulty obtaining inputs or when upstream firms (such as manufacturers) have difficulty finding buyers for their products. The United States courts have emphasized foreclosure as the primary problem associated with vertical mergers. Economists, however, have been skeptical that foreclosure has much economic impact unless it increases the capital barrier to entry by virtually requiring an entrant to enter at multiple stages of production.31 The courts have argued that foreclosure creates potential problems. For example, consider a series of vertical mergers that results in a shift in structure from the one in Figure 16.8 to the one in Figure 16.9. Such a change in structure may force potential entrants to enter both the manufacturing and retailing markets because of a fear of foreclosure. A potential entrant into the manufacturing stage in Figure 16.8 would have

*The major issues regarding foreclosure are examined in greater detail in later chapters dealing with public policy toward vertical mergers and other types of vertical restraints of trade. Here we simply introduce the concept.
twenty possible retail outlets. After the mergers, there are only eight retail outlets, only four of which are independent of the other manufacturers. If the integrated retailers carry only their manufacturer's brands, then the mergers foreclose the potential entrant from sixteen of the twenty retail outlets. The potential entrant may then be forced either to forgo entry altogether or to enter both vertical stages at once. Entry into both vertical stages greatly increases the capital barrier to entry.

The structure shown in Figure 16.9 also may foreclose the four remaining independent retailers from supplies of the manufactured good. This structure leaves the independents in a very precarious position at the mercy of the four integrated manufacturers for supplies. As a result, the independent retailers will probably abide by any demands made regarding vertical restraints, such as RPM or exclusive dealing, made by the manufacturers. The structure of Figure 16.9, therefore, also may make entry into the retailing sector far less likely than the structure of Figure 16.8.

It is important to understand that foreclosure is unlikely to have a major impact on pricing. The potential problem in Figure 16.8 is that there are only four manufacturers. This problem is no worse in Figure 16.9, in which there are still four manufacturers. It follows that except in extreme cases in which foreclosure is virtually complete and the capital barrier to entry is significantly increased, foreclosure is likely to cause few economic problems. As we will see in Chapter 22, however, this has not prevented the courts from using foreclosure as a primary reason for condemning vertical mergers.

**SUMMARY**

1. Most vertical integration reduces transactions costs.
2. Vertical integration and vertical relationships can solve several potential economic problems, including the problems of double marginalization, insufficient pre-sale service, and inefficient input substitution.
3. In the case of bilateral monopoly, double marginalization results in a higher price and lower welfare than a vertically integrated monopoly.
4. In the absence of vertical integration, downstream firms may attempt to free ride on the services provided by competitors. The use of resale price maintenance (RPM) may solve this free rider problem.
5. It has been suggested that RPM is used to facilitate collusion among either retailers or manufacturers, but little empirical evidence supports this theory.
6. Manufacturers may use RPM to maintain their products' high-quality image or to ensure that their retailers provide adequate services.
7. Vertical integration and vertical relationships can also be used strategically to increase entry barriers. Such practices include exclusive dealing arrangements and price squeezes.
8. Vertical integration may result in an increased capital barrier to entry if firms are forced to enter more than one vertical stage of an industry.

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**Discussion Questions**

1. Why might Ralph Lauren refuse to allow retailers to sell its Polo clothing at discount prices?
2. Under what type(s) of market structure is the problem of double marginalization likely to arise? Suggest two solutions to this problem.
3. A manufacturer of shoes purchases a chain of shoe stores. The four-firm concentration ratio in both shoe manufacturing and shoe retailing is low. Would you expect any serious anticompetitive impacts of such a merger?
4. Cosmetics (e.g., Estee Lauder, Liz Claiborne) and certain name-brand clothing (e.g., Liz Claiborne, Ralph Lauren) are commonly sold under RPM agreements. For which of these two product lines would you expect the provision of improved service to be a more valid justification for RPM? Why?
5. Can you suggest a good that you would be less likely to buy if it was not sold under suggested retail prices? What does this suggest about the relationship between your utility and the total number of units of this good that are sold?
6. A larger and larger percentage of American physicians are becoming employees of HMOs rather than being self-employed in their own practices. Might there be any anticompetitive effects if HMOs vertically integrated into hospital ownership? If most of America's largest hospitals were owned by HMOs, what do you think would happen to the number of self-employed physicians?
THE PROBLEM OF INPUT SUBSTITUTION

Suppose that a monopolist produces good X, using only two inputs, input M and input C. Input M is produced by a monopolist at marginal cost $MC_M$ and input C is produced in a perfectly competitive market at marginal cost $MC_C$. A vertically integrated firm that produced both inputs internally would maximize the following profits:

$$\Pi = TR - TC = P_XQ_X - (MC_Mq_M + MC_Cq_C)$$

It will be useful to define $P_X^*$, $Q_X^*$, $q_M^*$, and $q_C^*$ as the price and quantities that maximize profits $\Pi$.

The profit-maximizing firm must minimize production costs $TC = (MC_Mq_M + MC_Cq_C)$. At this point it is necessary to recall some intermediate microeconomic theory. For any given production function the \textit{marginal rate of technical substitution} (MRTS) is defined as the rate at which a firm can substitute one input for another input without changing output. Furthermore, the MRTS equals the slope of an isoquant at a point and firms \textit{minimize their long-run costs} by equating the MRTS, given by the slope of an isoquant, to the ratio of input prices, given by the slope of the isocost lines. Given any production function $Q_X = f(q_M, q_C)$, cost minimization, therefore, requires that the vertically integrated firm equate the MRTS between inputs to the ratio of the input prices. In a perfectly competitive world with all prices equal to marginal cost, the ratio of input prices also equals the ratio of the marginal costs of the inputs. Summarizing the theory mathematically cost minimization requires:

$$\text{MRTS} = \frac{MP_M}{MP_C} = \frac{P_M}{P_C} = \frac{MC_M}{MC_C}^*$$

where $MP_M$ represents the marginal product of input M, and $MP_C$ represents the marginal product of input C. The \textit{marginal product} of an input is the change in output associated with a small increase in the quantity of the input. The $MP_M$, for example, is the change in the quantity of good X ($\Delta Q_X$) associated with a change in the quantity of input M ($\Delta q_M$), or $\Delta Q_X / \Delta q_M$.

Suppose the production function for good X, $Q_X = f(q_M, q_C)$, is as follows:

$$Q_X = q_M^{\frac{1}{3}}q_C^{\frac{2}{3}}$$

This production function is of the general form:

$$Q = Aq^\alpha p^\beta$$

known as a Cobb-Douglas production function.
Further assume that $MC_M = MC_C = 1$. For production function 16.3, the cost-minimizing choice of inputs is defined by the following two equations:

\[ q_M = P_M \frac{1}{\sqrt{2}} R_M \frac{1}{\sqrt{2}} Q_X \quad [16.4] \]
\[ q_C = P_C \frac{1}{\sqrt{2}} P_M \frac{1}{\sqrt{2}} Q_X \quad [16.5] \]

The vertically integrated firm would behave as though the input prices equaled marginal cost; that is, for the vertically integrated firm $P_M = MC_M = P_C = MC_C = 1$. Substituting $P_M = 1$ and $P_C = 1$ into Eqs. 16.4 and 16.5 yields:

\[ q_M = 1 \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} Q_X = Q_X \text{ and } q_C = 1 \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} Q_X = Q_X. \]

Figure 16.10 shows the isoquants, which identify input combinations that yield equal outputs, for the production function given by Eq. 16.3 and for outputs $Q_X = 2$ and $Q_X = 4$. For $P_M = P_C = 1$, the equilibrium cost-minimizing combinations lie along the input expansion path $q_C = q_M$. The conditions for cost minimization imply that the vertically integrated firm would operate along the input expansion path OA utilizing the input combinations $q_M = q_C = Q_X$.

*Using calculus, the solution is derived by minimizing $TC_x$ with respect to $q_m$ and $q_c$, as follows:

\[ TC_x = P_M Q_M + P_C Q_C \quad (1) \]
subject to the condition that:

\[ Q_x = q_M \frac{1}{\sqrt{2}} Q_X. \quad (2) \]

From (2):

\[ q_C = \frac{Q_X}{q_M} = Q_X q_M \quad (3) \]

Substituting for $q_C$ from (3) into (1):

\[ TC_x = P_M q_M + P_C Q_X q_M \]

Minimizing with respect to $q_M$ yields:

\[ \frac{dT C_x}{dq_M} = P_M - \frac{P_C}{\sqrt{2}} Q_X = 0. \]

Solving for $q_M$:

\[ q_M = \frac{P_M}{P_C} Q_X = P_M \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} Q_X. \]

by analogous minimization with respect to $q_C$:

\[ q_C = P_C \frac{1}{\sqrt{2}} P_M \frac{1}{\sqrt{2}} Q_X. \]

Now consider the situation with three independent firms (one producing the final good and the other two producing the inputs). Would the monopolist manufacturer of $X$ still operate along the expansion path $q_M = q_C$? Competition would ensure that $P_C = MC_C$. Profit maximization by the monopolistic producer of input $M$, however, would ensure that $P_M > MC_M$. Assume that the monopolist input producer charges $P_M = 2$. From Eq. 16.4 and 16.5, with $P_M = 2$ and $P_C = 1$, the monopolist final good producer would now use input combinations:

\[ q_M = 2 \frac{1}{\sqrt{2}} Q_X = \frac{Q_X}{\sqrt{2}} \quad [16.6] \]
\[ q_C = 2 \frac{1}{\sqrt{2}} Q_X = \sqrt{2} Q_X. \quad [16.7] \]

In Figure 16.11 the profit-maximizing producer of good $X$ would then operate along a steeper input expansion path OB with a slope equal to $2$. As a result,

*The slope of OB is 2 because from Eq. 16.6 and 16.7:

\[ \frac{Q_X}{q_M} = \frac{\sqrt{2} Q_X}{Q_X} = \sqrt{2} = 2. \quad [16.8] \]
the social costs of producing any given output $Q_X$ would be too high, and economic efficiency in production would not be achieved. In Figure 16.11, for example, at point A the minimum social cost of producing $Q_X = 4$ is $P_C q_C + P_M q_M = 1 \cdot 4 + 1 \cdot 4 = 8$. The nonintegrated producer of good $X$, however, would produce at point B with social costs of $P_C q_C + P_M q_M = 1(5.66) + 2(2.83) = 11.32^*$. Furthermore, because the costs of producing any given $Q_X$ are too high, the monopolist manufacturer restricts output below $Q_X^*$, the profit-maximizing quantity, and welfare is unambiguously reduced compared with the vertically integrated case.

To eliminate the input substitution problem, the producer of good $X$ need only integrate, perhaps through merger, with the producer of the monopolized input $M$. The integrated firm would then evaluate the cost of input $M$ as $MC_M = 1$, and because $P_C = MC_C = 1$, the integrated firm would operate along the efficient input expansion path OA in Figure 16.11.

An alternative solution to the problem is for the producer of input $M$ to use a

tie combined with RPM to achieve the maximum profit. If the producer of input $M$ purchases input $C$ at $MC_C = 1$ and then ties the two products together for sale at prices such that:

$$\frac{P_M}{P_C} = \frac{MC_M}{MC_C} = 1,$$

the unintegrated monopolist manufacturer of good $X$ will operate along input expansion path OA. Because the prices of the inputs will be greater than marginal cost, the monopolist producer of good $X$ will want to charge a price greater than $P_X^*$. To guarantee that the profit-maximizing quantity $Q_X^*$ is produced, therefore, the input monopolist uses RPM to set the maximum retail price equal to $P_X^*$.

*Similarly, the minimum social cost of producing $Q_x = 2$ is 4 at point c, but the nonintegrated producer of $X$ would produce at point d with social costs of 5.32.