unless that agreement includes an RPM provision. Without an RPM agreement, there will be a tendency for the retail price to be too low to consumers with more elastic demand and too high to those whose demand is less elastic.[4]

As noted in the Reality Checkpoint above, the Supreme Court's ruling in the *State Oil vs. Khan* case removed the *per se* presumption against RPM agreements specifying a maximum price. In this case, State Oil Co. had imposed a maximum retail price on its distributors and one of these, Barkat Khan, tried to exceed that price *to premium buyers*. At the same time, he wanted to keep a low price to consumers of regular grade fuel. That is, Khan wanted to price discriminate. The RPM agreement subsequently legitimized by the Supreme Court appears to have been motivated in part by State Oil's need to prevent such price discrimination. In turn, this suggests that this motivation may well be important in promoting RPM contracts more generally.

17.4 RPM AGREEMENTS TO INSURE THE PROVISION OF RETAIL SERVICES

In the preceding two sections, we have investigated the use of an RPM agreement to set a ceiling on the price consumers pay. Note that even in the price discrimination case, double-marginalization plays a critical role. The difficulty is that the retailer will always want to add a higher, second markup to the price charged to the less elastic market segment. As the *Albrecht* and *Khan* cases (see above Reality Checkpoint) illustrate, this need to set an upper limit on retail prices is clearly one of the forces behind such vertical restraints. However, there are a number of reasons to doubt that double-marginalization and the need to limit downstream markups can be the sole or perhaps even the major explanation for observed RPM agreements.

First, note that the double-marginalization problem only arises when both the upstream and the downstream market are characterized by imperfect competition. If the downstream market is competitive, the manufacturer can set an upstream price of $PU = P^{D*}$ without fear of a second markup further distorting this price. Likewise, if the upstream market were competitive, the wholesale price would be equal to marginal cost c, and any downstream markup would never result in a price greater than P^{D*}.

Moreover, even when market power exists in both the upstream and downstream markets, there will often remain other, non-RPM solutions to the double-marginalization problem. As we noted in our single-market case of section 17.2, a two-part tariff can often resolve the problem. Even in the price discrimination case, an alternative contract based on a *minimum* retail price can do the trick. Specifically, the manufacturer could set a wholesale price of \$20 and impose an RPM requirement that the retail price never fall *below* \$60. This will lead to a competitive market price of \$60 by virtue of the RPM price floor. It will also lead to a retail price of \$60 in the monopolized market by virtue of retail profit monopolization. The manufacturer can then claim the \$1,600 via an upfront fee of $T = \$1600$.[5]

Finally, the historical evidence is that it has primarily been the retail lobby that has consistently led the fight to legalize and enforce RPM agreements at both the federal and state levels. In addition, as documented by both Overstreet (1983) and Steiner (1985), the vast majority of RPM court cases have been ones in which the issue was the setting of a

[4] See Chen (1999).

[5] See O'Brien and Schaffer (1994) for further theoretical analysis. See Lafontaine (1992, 1993, and 1995) for evidence on non-price vertical restraints. See also Mathewson and Winter (1998) for a useful review.

minimum retail price, not a maximum price. Similar evidence for the United Kingdom has been presented by Pickering (1966).

A clue to why our analysis so far has not emphasized RPM minimum price restraints is that we have only viewed retailing as an extra stage that occurs between production and final consumption. While insightful, this approach fails to incorporate any actual positive role for retailers. Yet retailers such as supermarkets, discount chains, and department stores provide many services that are valuable to manufacturers. Not only do they gather information about customer satisfaction and desired changes in the manufacturer's product, but they also provide such valuable services as the provision of desirable shelf space, large displays, advertising, and product demonstration. These services can be crucial to the marketing and sales of the manufacturer's product.

Consider the magazine industry. Supermarkets and discount chains presently account for over 60 percent of single-copy sales of US magazines. Because such sales are made at the full, nonsubscription price, they are profitable and quite important to publishing firms. Yet the publishers must rely heavily on the efforts of the retailers to sell their magazines. A prominent display near the checkout register, for example, can greatly increase sales. So can advertising or a promotional visit to the store by a celebrity. Publishers have a deep interest in making sure that the retailers undertake such efforts. Historically, publishers of *People* and other magazines, such as *Cosmopolitan* and *Harper's Bazaar*, have had tense negotiations with retailers such as Wal-Mart and Winn Dixie supermarkets over the display and promotion of various issues of these publications.[6]

A complete model of the relationship between a manufacturer and its retailers should therefore address the upstream manufacturer's interest in the provision of retail services, and the motivation for the retailer to incur the expense of such services. Promotion, product demonstration, and simply providing a pleasant place to shop are costly. Moreover, it is extremely difficult for the manufacturer to monitor the provision of such services. Taken together, these two facts mean that a manufacturer cannot simply specify the level of retail services that it wants for its product and assume that it will be provided. What is required is an enforceable contract that specifies the obligations of both the manufacturer and the retailer. It is this aspect of the vertical contract—that pertaining to the provision of retail services—that we now wish to examine.

Let us begin by describing how demand is affected by retail services. Denote by $D(p, s)$ the amount of the good demanded at price p with retail service level s. Increases in the level of services s raise the quantity demanded at any price or, alternatively, raise the willingness to pay of each consumer. We assume that this effect takes the form shown in Figure 17.1. In this case an increase in the service level from, say, s_1 to s_2 raises the willingness to pay of the marginal consumer. An example of a demand curve that captures this effect is $Q(p, s) = s(A - p)N$, where N is the number of consumers in the market. In inverse form, this is: $p = A - Q/sN$. The top price anyone is willing to pay for the product is $\$A$, no matter the service level, s, but more is bought as s rises.

Providing retail services is costly. Let the cost of supplying s retail services per unit of the good sold be described by a function $\varphi(s)$. We will assume that the provision of retail services is subject to diminishing returns so that raising the service level s raises the cost of providing such services and does so at an ever-increasing rate. (In calculus terms, this means that both $\varphi'(s)$ and $\varphi''(s)$ exceed zero.) For a given level of services, s, the retailer's

[6] G. Knecht, "Big Chains Get Advance Looks at Magazine Contents," *Wall Street Journal* 22 Oct. 1997, p. A1; C. Johnson-Greene "Walmart Cuts Magazine Shelf Space." www.foliomag.com, Sept. 9, 2009.

marginal cost of selling the manufacturer's product is $r + \varphi(s)$. This is the sum of the wholesale price paid to the manufacturer r plus the cost of providing s retail services per unit sold, $\varphi(s)$.

We now consider the provision of retail services under a variety of circumstances. We point out in advance that this presentation is a little advanced. For those who wish to skip this section, our main result is that, in the absence of vertical price restraints, it is unlikely that a retailer will provide the manufacturer's preferred level of service. The intuition behind this argument is straightforward. The manufacturer wants a high level of service because this will raise the price consumers are willing to pay and, hence, the manufacturer's profit. Yet while the profit gain of better service flows at least in part to the manufacturer, the cost of providing such service falls entirely on the retailer. Accordingly, the retailer's incentive to offer such service is reduced. Vertical restrictions such as a resale price maintenance agreement may be a way to overcome this difficulty, at least in part.

17.4.1 Optimal Provision of Retail Services versus Vertically Integrated Monopoly

Let's start by figuring out what is the efficient level of services from the viewpoint of society overall, i.e., the level that would maximize the combined consumer and producer surplus. Recall that efficiency in a market requires that price equal marginal cost. Because marginal cost for a given level of services is constant, we have that $p = c + \varphi(s)$, which means that there is no producer surplus. As shown in Figure 17.1, the social surplus at any price equal to $c + \varphi(s)$ is just the triangular area above the cost line but below the demand curve. Accordingly, the optimal choice of service level s is the level of s that maximizes the area of this triangle. By definition, this area is given by $\{A - [c + \varphi(s)]\}^2(Ns)/2$. We show in the Appendix that the service level s^* that maximizes this area must satisfy:

$$(A - c)/2 = \varphi(s^*)/2 + \varphi\prime(s^*)s^* \tag{17.1}$$

where $\varphi\prime(s^*)$ is the marginal impact of services on cost.

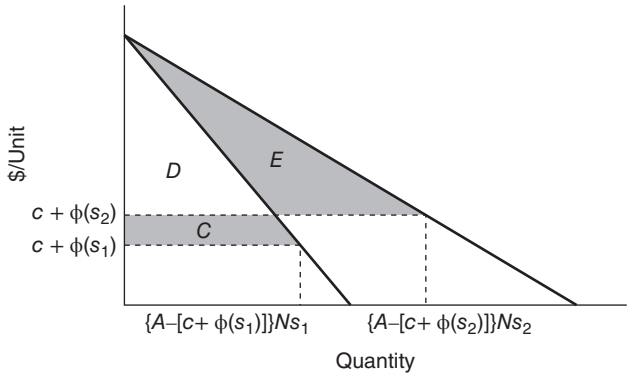

Figure 17.1 The effect of services on demand, costs, and the social surplus
Demand is given by $P = A - Q/sN$. This means that as the level of services rises from s_1 to s_2 the demand curve rotates up and to the right. At service level s_1, marginal cost $= c + \varphi(s_1)$. If price equals marginal cost, total demand is $\{A - [c + \varphi(s_1)]\}Ns_1$, and social surplus is the sum of areas C and D. At service level s_2, marginal cost $= c + \varphi(s_2)$. In this case, equality of price and marginal cost implies that total output $= \{A - [c + \varphi(s_2)]\}Ns_2$, and the social surplus is $D + E$.

Given a service level that satisfies (17.1), the socially optimal price is just the marginal cost of providing the output *plus* that service. Suppose for instance that $N = 100$, $c = 5$, $A = 10$, and that $\varphi(s) = s^2$ so that $\varphi\prime(s^*) = 2s^*$. A small bit of algebra then reveals that the social optimum calls for a service level of $s^* = 1$. (Remember, s is an index and so it is measured in arbitrary units.) At this level of service, optimality would require that the price be equal to $c + \varphi(s^*) = \$6$.

Now consider what the outcome will be if the product is provided by a vertically integrated monopolist producer and retailer. The profit of this integrated firm depends upon the price it sets and the service level it provides, and is:

$$\pi(p^I, s) = p^I(\mathrm{A} - p^I)Ns - [c + \varphi(s)](\mathrm{A} - p^I)Ns \tag{17.2}$$

Again, the derivation is provided in the Appendix but it is straightforward to show that the integrated monopolist's optimal service level must satisfy:

$$(\mathrm{A} - c)/2 = \varphi(s^I)/2 + \varphi\prime(s^I)s^I \tag{17.3}$$

At this service level, the integrated monopolist will set a retail price of:

$$p^I = [A + c + \varphi(s^I)]/2 \tag{17.4}$$

We of course assume that $c + \varphi(s^I) < \mathrm{A}$, so that the optimal price insures positive demand. A little reflection on equation (17.4) will reveal that it embodies our usual monopoly relation of price to marginal cost except that now marginal cost includes the service cost $\varphi(s^I)$ as well as the production cost c. As usual, the integrated monopolist will set a price of obtaining a unit of the good along with a given service level that exceeds the marginal cost of providing the good and the associated service cost $c + \varphi(s)$. This is shown in Figure 17.2.

Comparing equations (17.4) and (17.1), it is clear that they are the same. Although the integrated monopoly firm sets too high a price, the service level s^I that it chooses is the same as the socially optimal service level s^*. Returning to our numerical example, with $N = 100$, $c = 5$, $A = 10$, and $\varphi(s) = s^2$, we find that the integrated monopolist will set $s^I = 1$, but set a retail price of $p^I = \$8$. This price combined with a service level of $s = 1$, will yield a total market demand of 200 units, each of which incurs a \$5 production cost and a \$1 service cost. So, the integrated monopolist will earn a profit of $(\$8 - \$6) \times 200 = \$400$.

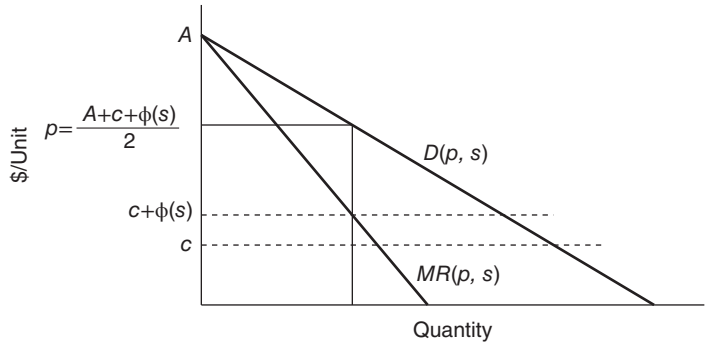

Figure 17.2 The integrated firm's optimal price as a function of the service level, s

As it turns out, the specific result that the integrated monopolist chooses the socially optimum service level reflects the particular demand and cost relationships that we assumed, and is not fully general. Nevertheless, the result is useful because it does show a rather general interest that the manufacturer has in providing retail services. As we shall shortly see, this is why vertical price restrictions establishing a minimum price can play a potentially welfare enhancing role.

17.4.2 The Case of a Monopoly Retailer and a Monopoly Manufacturer

Let's next examine the case where the retailing of the good is done by an independent monopoly downstream retailer. The manufacturer sells the product to the monopoly retailer at price r, after which the retailer sells the good to final consumers at retail price p^D and provides s^D retail services. In accordance with the notation used above, the retailer's profit downstream is

$$\Pi^D(p^D, s^D, r) = [p^D - r - \varphi(s^D)]\mathrm{D}(p^D, s^D) = [p^D - r - \varphi(s^D)]\, s^D N(A - p^D). \tag{17.5}$$

As in the case of the integrated firm, the retailer must choose the two strategic variables, retail price p^D and the level of retail services s^D. Note though that the retailer in this case has exactly the same profit-maximizing problem as did the integrated firm of the previous discussion, except that the retailer faces a marginal cost r that may differ from the true production cost c, depending on the upstream firm's wholesale price choice. So, we can work out the monopoly retailer's choices just by replacing c with r in equations (17.3) and (17.4). This yields the choices s^D and p^D satisfying

$$(A - r)/2 = \varphi(s^D)/2 + \varphi\prime(s^D)s^D \tag{17.6}$$

and

$$p^D = \frac{A + r + \varphi(s^D)}{2} \tag{17.7}$$

Because $r > c$ if the manufacturer is to earn any profit, the price implied by equation (17.7) exceeds that implied by equation (17.5). This is simply the double-marginalization problem again. At any given service level, the monopoly retailer adds the monopolist's markup to the markup already reflected in the manufacturer's wholesale price. Yet as a comparison of equations (17.6) and (17.4) also makes clear, having $r > c$ means that this double-markup is now compounded by a further problem, namely, a suboptimally low level of retail services. For any wholesale price $r > c$ the level of retail services chosen by the retailer s^D is less than the level s^* that is optimal from the viewpoint of both society and the upstream manufacturer.

Again, using the values from our numerical example, it is tedious but straightforward to show that if the manufacturer chooses the wholesale price r to maximize its profit, the outcome will be: $r = \$7$; $p^D = \$8.8$; and $s = 0.775$. Not only is the price too high, but the service level is too low relative to the social optimum. Profit is \$186 for the manufacturer and \$112 for the retailer, so the combined profit of \$298 is well below the \$400 profit of the

integrated firm. The intuition behind this outcome is also straightforward. Providing retail services is costly and this, along with the fact that the manufacturer charges a wholesale price r above marginal production cost, puts the squeeze on the retailer's profit. In response, the retailer tries to recapture some of the surplus by cutting back on services.

A two-part pricing agreement can resolve this issue. As usual, the manufacturer should sell to the retailer at marginal cost c, at which point the retailer's profit maximization problem becomes identical with that of the fully integrated firm. This will induce the retailer to provide the optimal service level s^* and price p^I that generate the maximum profit. The manufacturer can then claim all or part of that profit by its choice of the fixed fee T. Returning to our numerical example, $s^* = 1,\ r = c = \$5$, and $p^D = p^I = \$8$ and $\$298 < T < \$400$.

17.2 Practice Problem

Assume as in the example in the text that $c = 5$ while $\varphi(s) = s^2$, so that $\varphi\prime(s) = 2s$. Assume that the manufacturer sells through a monopoly retailer and initially sets a wholesale price, r equal to \$6. Assume that retail demand is $Q(p, s) = s(10 - p)100$.

a. What will be the retail service level and the retail price? How much output will be sold at this price and service level combination? What will be the manufacturer's profit?
b. Compare the manufacturer's profit at $r = \$6$ rise with its value at $r = \$7$. What does this increase in r do to the level of retail services?

17.4.3 The Case of Competitive Retailing

Let's now consider the case of a competitive retailing sector. This is often the more realistic case. It is also a market structure that should work to the manufacturer's benefit. When there is only one retailer, the manufacturer's reach into the retail market is limited, as is its bargaining power with respect to claiming any of the additional profit that coordination yields. When there are many retailers, both the manufacturer's reach and bargaining power are enhanced. Competition among the retailers downstream will bring the retail price-cost margin to zero, and therefore, minimize the problem of double marginalization. The issue of the provision of promotional or retail services, though, still remains. We want to determine the level of services s^c provided by a competitive retail sector and compare that level with the manufacturer's preferred amount, s^*.

We assume that all the downstream retailers are identical. Each buys the manufacturer's product at a wholesale price r and incurs the cost $\varphi(s)$ per unit of output for retail service s. A little thinking leads us to two quick results. First, we know that retail competition will drive the retail price down to marginal cost. In other words, the price to final consumers will have to be $p = r + \varphi(s)$. Second, that same competitive pressure will also force every retailer to offer at that price, the level of services most preferred by consumers. Any retailer who offered a lower service level would quickly lose all its customers. Accordingly, competitive pressure will lead each and every retailer to offer the same retail price and the same service package. The competitive retail price will be $p^C = r + \varphi(s^C)$, and the competitive service level s^C will be the level that maximizes consumer surplus given the price p^C. In Section 17.4.1 we showed that when the price of the good is equal to its true marginal cost, i.e., when $p = c + \varphi(s)$, consumer surplus is $\{A - [c + \varphi(s)]^2 Ns/2$.

Reality Checkpoint

Leather Cuts All Too Deep

When the US Supreme Court agreed on December 7, 2006, to hear the case, *Leegin Creative Leather Products, Inc. v. PSKS, Inc*., No. 06A179, it meant that the court was ready to consider a further major revision of its policy toward vertical price restraints.

In 1997, the women's leather accessories firm, Leegin, had initiated a new marketing policy designed to encourage retailers to promote its brand in a separate section of their stores. In order to participate in this program, retailers had to pledge to adhere to Leegin's suggested prices at all times. PSKS was one of the retailers who agreed to participate in Leegin's program. In 2002, however, faced with disappointing sales, PSKS sharply discounted the Leegin price. Leegin then suspended its shipments to PSKS and the parties went to court.

Similar to Albrecht and Khan, PSKS argued that the Leegin agreement was *per se* illegal and therefore an invalid price-fixing agreement. In the initial trial, PSKS won an award that totaled $1.2 million in damages, which was then trebled. Leegin appealed and directly challenged the *per se* rule to vertical minimum resale price maintenance. When the appellate court affirmed the district court's decision, Leegin appealed to the Supreme Court.

While the *State Oil v. Khan* decision had removed the *per se* prohibition against maximum resale price agreements, it left intact the *per se* unlawful status of *minimum* price restraints. On June 28, the Supreme Court issued its decision. In *Leegin Creative Leather Products, Inc. v. PSKS, Inc*., 551 U.S. (2007) the court overturned the nearly century-old *Miles* case precedent. Henceforth, in the United States (but not generally in Europe), both minimum and maximum RPM agreements would be subject to a rule of reason test.

Source: S. LaBaton, "Century-Old Ban Lifted on Minimum Retail Pricing," *New York Times*, June 29, 2007, p. A1.

It follows that when price $p = r + \varphi(s)$ consumer surplus is just $\{A - [r + \varphi(s)]\}^2 Ns/2$. Maximizing this with respect to s (see Appendix) yields the service level under competitive retailing, s^C

$$(\mathrm{A} - \mathrm{r})/2 = \varphi(s^C)/2 + \varphi\prime(s^C)s^C \tag{17.8}$$

where as before $\varphi\prime(s^C)$ is the marginal effect of service on cost(measured at the value s^C).

Comparison of the value s^c that satisfies equation (17.8) with the manufacturer's preferred efficient level of services (s^* in equation (17.1) or s^I in (17.3)) reveals that the competitive outcome will again provide too low a level of services so long as the wholesale price r exceeds the production cost c. This time though, the reduction in services is not really the result of retailers trying to cut services so as to increase their margin over cost. To the contrary, retailers compete vigorously in providing services. Instead, the problem is that there is in fact no "margin." Competition drives the retail price to be precisely enough to cover the wholesale price plus service cost and no more. While consumers like retail services, they also like low prices and the competitive retail sector tries to give them a bit of both. Thus, for example, if the manufacturer sets $r = \$7$, retailers will now provide services of $s^C = 0.775$ at a cost of $0.60. This is less than the service the manufacturer would prefer but it allows the retailers to keep the price to consumers down to $7.60.

The manufacturer earns a profit of \$371.81, which turns out to be the best that can be done in this case if we limit the manufacturer's choice simply to choosing its own markup and the implied wholesale price r.

A solution to the problem must recognize two facts. First, a two-part tariff strategy is no longer workable because there is no retail profit to extract via a lump sum fee T. Second, this is a case in which the retail price is too *low*— \$7.60 in our example relative to the \$8 price set by the integrated monopolist. Together, these two facts suggest that an RPM agreement is needed and that in this case, the agreement should specify a *minimum* price. In particular, the manufacturer can employ an RPM setting a price floor equal to that chosen by the integrated monopolist p^I and then set the wholesale price r just high enough to cover the cost of the optimal service level s^I, that is, $r = p^I - \varphi(s^I)$. Unable to compete by further price reductions, the competitive retailers will focus totally on service and compete away all retail profit by providing exactly s^I just as the manufacturer wishes. Returning to our example, the manufacturer should impose an RPM agreement setting a price floor of \$8 but continue to set a wholesale price of \$7. Retail competition in services will then proceed until $s^C = 1$ and $\varphi(s^C) = 1$ as well so that the downstream price $p^D = r + \varphi(s^C)$. It is easy to verify that doing this will restore the manufacturer's profit to \$400—the same profit as the fully integrated firm.

17.4.4 RPM Agreements, Service, and Free-Riding

One moral of the two cases just considered is that once the costly provision of customer services is included in the analysis, an RPM agreement with a *minimum* price becomes more necessary to insure proper service provision as the downstream market becomes more competitive. There is in fact another reason why this is likely to be the case. This is because many customer services—particularly informational services such as advice on different price and quality combinations, best use practices, and so forth—have the quality of a public good. They are difficult to charge for and easily shared. As with all public goods, provision of these services is likely to be too low.

Think about it for a moment. A consumer electronics shop may keep experts on hand to assist a customer in choosing the digital camera that best meets the customer's needs in terms of portability and convenience, works most effectively with the customer's computer and other peripherals, and fits best within her budget. Similarly, wine shops may employ personnel to advise customers regarding the quality of a particular vintage or the food that best accompanies a given wine.

Providing such presale or point of sale services is costly. Unfortunately, there is no obligation for the consumer, once educated by the store's expert staff, to buy from that specific establishment. Quite to the contrary, once fully informed, the consumer has a strong incentive to go to the "no frills" electronics shop down the street or to the discount wine shop around the corner and purchase what the consumer now knows to be the proper digital camera and the appropriate wine at a lower price. Even worse, the consumer is free to share this information with friends who can then use this knowledge to bypass the specialty shops altogether and go directly to the low-price, low-service outlets.

Because information is a public good, it is hard to deny it even to those who do not pay for it. The low-price discount dealers in our two simple examples are "free riding" on the specialty shops. We call this behavior free riding because the discounter benefits from the activities of the specialty shop but does not pay for them. The scenarios above indicate the likely outcome of this problem. Specialty shops that incur the cost of providing in-store

demonstrations and consultations will lose market share to the "no frills" discount stores. As such discount stores come to dominate the retail market, few retail services will be provided overall.

At this point, the advantage of an RPM agreement should be clear. It prevents one retailer from undercutting another and, hence, stifles the emergence of discount stores. In turn, this implies that consumers will visit the retailer who provides the best services because they will not find a lower price elsewhere. By putting a freeze on price discounting, the effect of an RPM agreement is to foreclose discount outlets, resulting in a possibly higher average retail price. Yet this price effect and the loss it imposes on consumers may be offset by the gains that the provision of retail services generate, not only for consumers but for the manufacturer as well.[7]

Moreover, the free-riding justification for RPM applies to more than just purely informational services. For example, higher-end stores such as Bloomingdales, Neiman-Marcus, and Bergdorf Goodman play an important role in identifying and then selling "what's hot" or in fashion. Here again though, providing this service is not cheap. These stores must spend considerable resources to build up their reputation for being on the "cutting edge" of fashion trends. Just by carrying the line of a specific manufacturer, such stores identify the top brands and fashions. Manufacturers need retailers to play this role. Yet if a consumer can go window shopping at a prestigious store to find out "what's in" this season and then buy the apparel at a discount store, we again have the problem of free riding and, along with that, a potential justification for the use of an RPM agreement specifying a floor price.[8]

17.5 RETAIL PRICE MAINTENANCE AND UNCERTAIN DEMAND

We have been discussing in the preceding two sections the way in which competitive pressures in the retail market can reduce the profit of the manufacturer and the welfare of consumers by creating disincentives to provide customer services. However, retail competition can be destructive in other ways as well. Deneckere et al. (1997) demonstrate how uncertain retail demand can produce such an outcome. [9]

Goods are not sold continuously. Instead, retailers place orders with manufacturers and then hold an inventory stock to buffer against movements in demand. As a result, each retailer faces a dilemma in determining how much output to stock for sale to final consumers. On the one hand, the retailer will wish to have the amount on hand necessary for profit maximization during periods when demand is strong. On the other hand, if demand is weak, retailers with a lot of stock will have to do one of two things. Either they try to sell the output or they can absorb the extra output (or simply throw it away) and thereby keep the price high.[10]

It is in this situation that the behavior of the monopolist and the competitive firm will differ. Faced with weak demand, the monopolist will tend just to dispose of (or just hold indefinitely) a good bit of its excess inventory because the monopolist recognizes that every

[7] Tesler (1960) first articulated this view. See also Bork (1966). For an opposing view see Steiner (1985).

[8] Mathewson and Winter (1983) make a similar argument that resale price maintenance can benefit consumers by economizing on consumer search costs because consumers will no longer spend time trying to find out which retailer sells at the lowest price.

[9] See also Marvel and McCafferty (1984).

[10] We assume that inventories cannot be stored. Either they physically perish or become worthless due to the introduction of new goods.

extra unit sold lowers the price on all units. A firm in a competitive retail sector, however, will do the opposite. Under competition, each retailer perceives that its own sales have no or little effect on the market price. Accordingly, each such competitive retailer will try to sell all of its stock. After all, it has already paid for it and it may as well try to get something for it rather than throw any of it away. The problem is that if all retailers act this way the market the price will fall, possibly quite far.

The fact that competition induces sharp price-cutting during periods of weak demand has two implications. First, a manufacturer selling through a competitive retail sector will not earn the profit of an integrated firm. Second, the manufacturer will also find it difficult to induce retailers to hold any sizable inventory because retailers will recognize that they might end up getting rid of that inventory at a very low price. An RPM agreement that establishes a minimum retail price can solve the manufacturer's problem. The reason is straightforward. Setting a minimum price at which the good can be sold ensures that in periods of low demand, retailers will deal with excess inventory exactly the way that an integrated manufacturer would choose. They will throw away the amount that cannot be sold at the specified retail price.

We illustrate the essential insight of the Deneckere et al. argument in Figure 17.3. The figure shows the price and profit outcome for an integrated monopolist manufacturer facing variable demand. As usual, we assume a constant unit cost, c. With probability one-half, demand is strong and the demand curve is D_H. Similarly, with probability one-half, demand is weak and the demand curve is D_L. The integrated monopolist then faces a two-stage problem. In stage one, the firm must choose how much to produce, Q. Once the firm has produced this amount, it will have incurred a cost, which is now sunk, equal to cQ. Afterwards, demand will be either strong or weak, D_H or D_L. At that point, the firm will have no additional cost and will simply have to choose how much of the output in its inventory that it actually wants to sell. Of course, the integrated firm can sell no more than it originally produced, Q. Subject to this constraint, however, it will simply sell the amount that maximizes its revenue conditional upon demand. Because all its costs are sunk, revenue maximization and profit maximization amount to the same thing in the second stage.

The integrated firm will never initially produce more than the amount that would maximize profit if it knew for sure that demand would be high. This is an amount at which the marginal revenue when demand is D_H equals marginal production cost, c. It is shown as Q^{UPPER} in Figure 17.3. To produce more than this level would guarantee that the firm

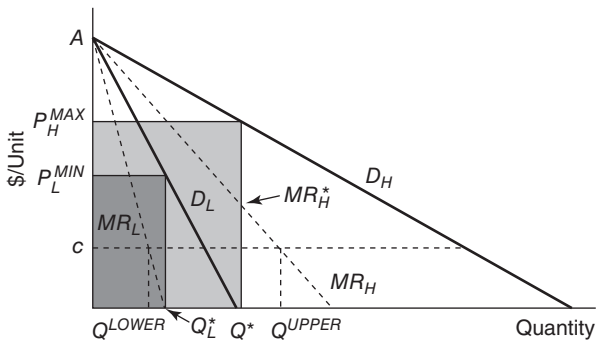

Figure 17.3 Resale price maintenance and variable demand

earns a marginal revenue below its production cost even in the best of demand conditions. Similarly, the firm will never produce for inventory an amount less than Q^{LOWER}, the amount it would produce if it were certain demand would be low. To do so would guarantee too little inventory even in the weakest of markets. The firm must produce somewhere between Q^{LOWER} and Q^{UPPER}. Within this interval, optimization requires that it choose an amount whereby its marginal cost c equals its expected marginal revenue, or one-half times the marginal revenue in a high-demand state plus one-half times the marginal revenue in a low-demand state (which is bounded by zero).

As we have drawn Figure 17.3, the optimal amount of initial production is Q^*. Note that in this figure, demand is quite variable. As a result, in order to come even close to the true profit-maximizing level in a high-demand state, the amount produced for inventory Q^* would be enough to drive the price to zero if it is all sold in a weak-demand state.

If demand is strong, the firm will sell the entire amount Q^* at the price ${P_H}^{MAX}$. If demand is weak, an inventory of Q^* is excessive. Because the integrated firm has already incurred its production cost, all it can do then is maximize its revenue. It will do this by selling the amount Q_L^* at the price, ${P_L}^{MIN}$. This is an output at which marginal revenue is zero. Weak demand does not lead the firm to try to liquidate its entire inventory, as such an action would drive the price to zero. Instead, the firm throws away the amount $Q^* - {Q_L}^*$. When demand is weak, the firm drives its marginal revenue to zero. However, because this occurs where the price is still positive, the firm's total revenue remains greater than zero even in the face of weak demand. Its marginal revenue when demand is strong is the marginal revenue at Q^*, shown here as MR_H^*. Its expected marginal revenue is therefore ${MR_H}^*/2$ which is an amount just equal to c.

The integrated monopolist firm will expect to earn a positive profit in this story. Its total cost is cQ. Its revenue in a low demand period is ${P_L}^{MIN}\ {Q_L}^*$. This is the lightly shaded rectangle in Figure 17.3. Its revenue in a high-demand period is ${P_H}^{MAX}\ Q^*$. This is the sum of the darkly shaded rectangle and the lightly shaded region in the figure. The expected profit for the integrated firm, Π_I^e is therefore

$$\Pi_I^e = \frac{1}{2}P_H^{MAX}Q^* + \frac{1}{2}P_L^{MIN}Q_L^* - cQ^*. \tag{17.9}$$

Now consider what happens under competitive retailing. If competitive retailers stocked the optimal amount Q^*, they would earn less total profit than that shown in equation (17.9). The reason is the nature of competition. In a low-demand period, the integrated firm sells only up to the point at which its marginal revenue is zero. However, competitive firms holding a total inventory of Q^* will sell more than this amount. Each such firm perceives price and marginal revenue to be the same. Hence, having already sunk the cost of acquiring its inventory, each such firm will continue to sell its inventory so long as the price is positive. Yet if demand is weak, the amount Q^* can only be sold by driving the retail price—and not just the marginal revenue—to zero. This means that a competitive retail sector with an inventory equal to Q^* will earn no revenue when demand is low. Of course, when demand is high, retailers will sell the entire stock Q^* for the price ${P_H}^{MAX}$ and generate exactly the same revenue as would an integrated monopolist. However, because the competitive outcome during a low-demand period is a zero price, competitive retailers will always generate less total profit from the optimal inventory stock, Q^*, than would an integrated monopolist whose revenue remains positive even when demand is weak.

In short, unfettered competition during a period of weak demand dramatically reduces the revenue retailers can expect to earn. Accordingly, a manufacturer can only persuade

retailers to stock the optimal amount Q^* by selling to them at a sufficiently low wholesale price P_W, so that retailers can still expect to break even. Because retailers only earn positive revenue when demand is high, $P_W Q^*$ must equal the revenue earned by retailers in a high-demand period, times the probability that such a period occurs. Therefore, $P_W Q^*$ must equal ${P_H}^{MAX}\ Q^*/2$, implying that $P_W = {P_H}^{MAX}/2$. In turn, this implies an expected profit, Π^{e}, for the manufacturer without an RPM agreement of

$$\Pi^{\mathrm{e}} = \left(\frac{1}{2}\mathrm{P}_{\mathrm{H}}^{\mathrm{MAX}} - \mathrm{c}\right)\mathrm{Q}^*. \tag{17.10}$$

A comparison of equations (17.9) and (17.10) shows that the profit of the manufacturer in this case will be less than that earned by its integrated counterpart by an amount equal to ${P_L}^{MIN}\ {Q_L}^*/2$. However, an RPM agreement can save the day. The necessary features of such an agreement are suggested by Figure 17.3. That figure shows that the integrated firm never sells at a price below ${P_L}^{MIN}$. So, the nonintegrated manufacturer should negotiate an RPM agreement that likewise prohibits anyone from selling below this price. In addition, it should charge a wholesale price $\mathrm{P_W}^*$, satisfying

$$\mathrm{P}_{\mathrm{W}}^*\mathrm{Q}^* = \frac{1}{2}\mathrm{P}_{\mathrm{H}}^{\mathrm{MAX}}\mathrm{Q}^* + \frac{1}{2}\mathrm{P}_{\mathrm{L}}^{\mathrm{MIN}}\mathrm{Q}_{\mathrm{L}}^*. \tag{17.11}$$

In turn, this implies that

$$\mathrm{P}_{\mathrm{W}}^* = \frac{1}{2}\mathrm{P}_{\mathrm{H}}^{\mathrm{MAX}} + \frac{1}{2}\mathrm{P}_{\mathrm{L}}^{\mathrm{MIN}}\frac{\mathrm{Q}_{\mathrm{L}}^*}{\mathrm{Q}^*}. \tag{17.12}$$

At this wholesale price, the competitive retail sector will in fact buy and inventory the optimal amount, $Q*$. Why? When they buy this amount, retailers know that their expected revenue, ${P_H}^{MAX}\ Q^*/2 + {P_L}^{MIN}\ {Q_L}^*/2$, just equals their expected cost, ${P_W}^* Q^*$. Hence, the inventory of Q^* is exactly the amount that leads to an expected profit of zero for retailers. This of course is the equilibrium requirement for a competitive retail sector. Moreover, because retailers buy the amount Q^* at this wholesale price, the manufacturer's expected profit, Π^e_{RPM}, with an RPM is

$$\Pi^e_{RPM} = P_W Q^* - cQ = \frac{1}{2}P_H^{MAX}Q^* + \frac{1}{2}P_L^{MIN}Q_L^* - cQ^* \tag{17.13}$$

A comparison of equations (17.9) and (17.13) quickly reveals that this RPM agreement permits the manufacturer in this case to earn the same profit as that earned by an integrated firm.

It is important to note that it is not just the manufacturer who may benefit from the RPM agreement just described. Such an agreement can potentially also enlarge the expected consumer surplus. This is easiest to see by recognizing that absent an RPM agreement, retailers may not be willing to offer the product to consumers at all. More generally, competitive retailers will buy less inventory in equilibrium without an RPM agreement than they will buy with one. As a result, the price during a period of strong demand will be higher without an RPM contract. This price increase hurts consumers and may more than offset the gains consumers enjoy from permitting prices to fall quite far when demand is

weak. Hence, under uncertain demand in a competitive retail sector, both the manufacturer and consumers can benefit from an RPM agreement.[11]

17.3 Practice Problem

Suppose that demand is either strong (with probability one-half) and described by $Q = (10 - p)100$, or weak (with probability one-half) and described by $Q = (10 - p)30$. To simplify further, assume that the manufacturer's unit cost is constant at $c = 0$.

a. Show that the revenue-maximizing price is \$5 regardless of whether demand is weak or strong.
b. Assume that the firm produces 500 units prior to learning the strength of demand. How much of this will it sell when demand is strong? How much will it sell when demand is weak? What is the firm's expected profit?
c. Suppose now that the firm sells the 500 units through a competitive retail sector. If retailers buy and stock the entire 500 units, what will be the retail price when demand is strong? What will be the retail price when demand is weak?
d. In light of your answer to (c), what wholesale price will induce the retailers to purchase initially an inventory of 500? What will be the manufacturer's profit at this price?

17.6 RPM AGREEMENTS AND COLLUSION

We noted at the beginning of this chapter that while academics and the courts have varied in their views of non-price vertical restraints (next chapter), there is a long tradition that views vertical restrictions on prices—particularly RPM agreements—much more negatively. Indeed, until quite recently, all such agreements were held to be *per se* illegal. Given that the examples thus far considered in this chapter point to a positive role for RPM agreements, one might wonder why the suspicion of RPM agreements has been so persistent and so long-lasting.

The critical element contributing to the negative view of vertical price restraints is the suspicion that these agreements substantially raise the possibility that firms can collude, i.e., that they facilitate the suppression of interbrand competition. The US Supreme Court was explicit on this point. In the *Business Electronics v. Sharp Electronics* case (1988), the Court wrote that "there is a significant distinction between vertical price and vertical non-price restraints." The Court continued by noting that there has long been a presumption that "vertical price restraints reduce interbrand competition because they 'facilitate cartelizing.'"[12] Yet while the fear that RPM might facilitate collusion may be legitimate, formal analysis of this hypothesis has been limited. However, two recent papers illustrate why this concern may be legitimate.

The first of these is Jullien and Rey (2007). The intuition in this paper is quite straightforward. Consider two manufacturers, each of whom sells a differentiated product

[11] The manufacturer always gains from the specified RPM agreement. The outcome for consumers depends on just how variable is demand. If demand is highly variable, consumers are probably hurt by the agreement. However, if demand is only moderately variable, consumers may well benefit from the agreement.

[12] *Business Electronics Corp. v. Sharp Electronics*, 485 U.S. 717 (1988). The Court's statement refers to its earlier analysis in *Continental T.V. Inc. v. GTE Sylvania Inc*. 433 U.S. 36 (1977).

and who compete in prices as described in Chapter 10. Each manufacturer sells to final consumers through its own exclusive retailer at a wholesale price w_i who, in turn, sets the final retail price p_i. It is, of course, that pair of final prices that determines the sales of the upstream producers. Marginal cost is assumed to be zero. The retail demand facing each is:

$$p_i = \mathrm{A} - q_i + \beta p_j + \varepsilon_i \quad i, j = 1,2\ i \neq j \quad 0 < \beta < 1 \tag{17.14}$$

Here, ε_i is a random shock term reflecting the variation in retail demand q_i. Such shocks occur after the wholesale price has been set but before the retail price is determined. Critically, firm j and its retailer can observe only the price p_i that retailer i sets in response to manufacturer i's wholesale price w_i, and the demand shock ε_I. From Chapter 10 we know that i's best response, given its observed ε_I shock and its expectation for firm j's price p_j^e, is to set $p_i = \left(\frac{A + w_i + \varepsilon_i}{2}\right) + \left(\frac{\beta}{2}\right) p_j^e$. Since this implies that the expected value of $p_i = p_i^e = \left(\frac{A + w_i}{2}\right) + \left(\frac{\beta}{2}\right) p_j^e$, equation (17.14) can be rewritten as:

$$p_i = p_i^e + \frac{\varepsilon_i}{2} \qquad i, j = 1,2;\ i \neq j \tag{17.15}$$

In other words, firm i's retailer would adjust its retail price in response to demand shocks to be different from what was initially expected. This flexibility however makes collusion more difficult. It means that if firm i observes a low retail price p_j being charged by its rival, it cannot tell whether that is due to a negative demand shock, a move on i's part to price more aggressively or, in the context of collusion, to cheat on the cartel. Consequently, cheating detection is difficult, and, as we know, this makes it more difficult to sustain a cartel.

Matters change with an RPM agreement. Now, any change in the retail price can only occur if the upstream manufacturer changes the RPM price bound. Accordingly, the RPM agreement facilitates collusion. It is not a perfect outcome. The fact that retail prices are pre-set now means that they cannot react to demand shocks and this is a true cost. In addition, because collusion with an RPM agreement permits pushing the price closer to the joint monopoly price than collusion without an RPM agreement does, the one-period gain from cheating is larger when RPM agreements are employed. This of course makes the cartel less sustainable. Still, Jullien and Rey (2007) show that the detection effect will often win out. When it does, firms will find it profitable to adopt RPM agreements that lead to retail prices close to the joint-profit-maximizing level, and that leave consumers worse off.

More recently, Rey and Vergé (2010) offer an alternative model of RPM-facilitated collusion in which, contrary to the case above, manufacturers sell through the same distributors. To take the simplest case, imagine two upstream manufacturers, A and B, and initially, just one downstream retailer that we will call retailer 1. This retailer then sells two differentiated goods that we will call A1 and B1. If retailer 1 could buy at cost from each producer it would then set prices p_{A1}^* and p_{B1}^* that would maximize its joint profit from the two products. That is, retailer 1 would internalize the competition between the two products and so coordinate their prices to earn the maximum profit possible in this market. The prices p_{A1}^* and p_{B1}^* are, in fact, precisely the prices that would be set by the manufacturers themselves if they were fully integrated firms and were cooperating with each other.

The outcome just described is in fact achievable by each manufacturer using a two-part contract in which each sells to the retailer at cost and then claims its share of the resultant

profit for itself via the fixed fee. To see this, suppose that firm A adapts such a two-part pricing scheme in which it sells to retailer 1 at a price per unit equal to marginal cost and then takes a chunk of profit by way of a fixed fee F_A. Given that, the best that firm B can do is to work out a contract that will maximize the retailer's profit net of its payment to firm A, and then claim that profit with a fixed fee F_B. The way to do this is again to price at marginal cost. No RPM agreement is necessary to achieve the joint (three-way) maximum profit when both producers sell through a single retailer.

Matters change though if the two producers also sell through a second downstream firm, retailer 2. The reason is that there is now retail competition as well as upstream competition. Analogous to p^*_{A1} and p^*_{B1}, denote now the prices p^*_{A2} and p^*_{B2} as the monopoly profit-maximizing prices that would be set if both producers sold only through retailer 2. Suppose for example that both manufacturers adopt the foregoing two-part pricing at both downstream retailers in the hope that this will yield the four final market prices, p^*_{A1}, p^*_{B1}, p^*_{A2}, and p^*_{B2}. Because the retailers are buying at cost, however, setting these prices implies that each retail price reflects the highest possible markup. As a result, each retailer will find that it can increase its profit significantly by cutting either of its retail prices and stealing business from its rival. Indeed, each producer will be tempted in this way as well.

To put it another way, the pair of prices p^*_{A1} and p^*_{B1} are not retailer 1's best response to a choice by retailer 2 to charge the prices p^*_{A2} and p^*_{B2}. Because each manufacturer is selling at cost, the margin on additional retail sales is very large—creating an equally large incentive to cut retail prices. Manufacturers can dull this incentive by instead selling at a wholesale price r that exceeds marginal cost. Yet this runs into two problems. The first is the familiar one of double-marginalization. The second is the related one that if producer A sets a wholesale price above marginal cost, producer B has an incentive to undercut this so that its products will sell at lower retail prices. In other words, for feasible contract types the retail competition is likely to extend upward to wholesale price competition between the manufacturers. Rey and Vergé (2010) show that in the absence of any RPM agreements, the market outcome is likely to be fairly competitive.

The appeal of RPM agreements now is clear. They suppress retail competition. If for example retailers are perfect Bertrand competitors, wholesale prices map one for one into retail prices and manufacturers compete directly with each other via wholesale prices. RPM agreements weaken this link by allowing a positive retail margin (and can never do worse than a no RPM strategy).[13]

17.7 EMPIRICAL APPLICATION: RPM AND PRICES—EVIDENCE AFTER LEEGIN

Vertical price restraints have been the subject of both considerable academic debate and spirited as well as evolving legal controversies. The recent court decisions in *State Oil v. Khan* and, even more particularly, *Leegin* however mark a clear shift in antitrust doctrine towards more acceptance of vertical price restraints, including RPM agreements, in the recognition that the coordination such restraints make possible may well work to the benefit of consumers. Yet it seems clear that there are potential pitfalls in this approach and that tolerance of RPM agreements can yield results inimical to consumers and economic efficiency.

[13] Rey and Vergé (2010) make clear that the joint monopoly outcome is just one of a continuum of possible equilbria, with each equilibrium corresponding to a different wholesale price. In many ways, the Rey and Vergé (2010) analysis is a generalization of the earlier analysis in Bernheim and Winston (1985).

An interesting paper by Smith and MacKay (2013) explores the effect of RPM on prices by considering the effect of the *Leegin* decision across different states. While the *Leegin* decision made clear that the federal courts would now treat RPM agreements more leniently, the impact on state laws and legal practices was less clear. Many states, such as Texas, do include formal statements in their business and commercial codes that they will be guided by and follow closely federal precedent where applicable. In these states, the change in the federal approach to a rule-of-reason treatment of RPM agreements that *Leegin* introduced would likely liberalize their legal treatment of such agreements as well. On the other hand, there are a number of states, such as California, in which the state antitrust laws and court precedents indicate a very strong presumption that RPM contracts are a *per se* violation of the antitrust laws. To the extent that antitrust litigation is rooted in local courts, the *Leegin* ruling might not have very much impact on these states.

Smith and MacKay (2013) use the foregoing logic to frame a natural experiment designed to reveal the impact of RPM agreements. Based on their legal and legislative history they identify a group of twenty-four states in which the *Leegin* decision would likely lead to a more legally tolerant view of RPM contracts, and a group of eleven states in which the *Leegin* decision is unlikely to change the (much harsher) legal treatment of these agreements. They then use data from a relatively new data set collected by Nielsen on actual weekly purchases by consumers of literally thousands of items over the years 2004–09. While this includes 1.4 million separate products, Nielsen groups these products in 1,025 modules such as "brandy" or "sleeping aids." Smith and MacKay (2013) were able to examine 1,025 of these.

Smith and MacKay (2013) then construct a weighted price (in logs) for each product sold by each retailer in each state in each week t. For each of the 1,025 product modules, they then estimate the following regression:

$$\ln P_{jrst} = \alpha + \beta_1 RoR + \beta_2 L_t + \beta_3 (L \times RoR_S) + \text{Other characteristics and Fixed Effects} + \varepsilon_{jrst}$$

Here, $\ln P_{jsrt}$ is the log price of product j sold by retailer r in state s and week t; RoR_S is an indicator variable that takes the value of 1 if that state s is in the Rule of Reason group, and 0 for the control group comprised of those states with strong *per se* presumptions of illegality in which *Leegin* is expected to have little effect. L is an indicator variable that takes the value 1 if the observation is in a week t that is after the *Leegin* decision on 28 June 2007 but 0 before that date. Finally, L^*RoR_t is an interactive term that is 1 in all weeks after the *Leegin* decision but only for the Rule of Reason groups of states. In all other cases it is 0.

It is the coefficient β_3 on the third term that is most critical. The coefficient β_1 indicates the general difference in prices between the *RoR* group and the control group of *per se* states. The coefficient β_2 reflects the general effect that the *Leegin* decision had on both groups of states. It is the coefficient β_3 though that captures the difference in the effect that the *Leegin* decision had on the RoR group *relative* to the control group. Thus, the coefficient β_3 is really the "difference-in-difference" estimator discussed earlier in Chapter 10. That is, it will capture how much more (if any) prices have risen in the Rule of Reason states after *Leegin* than in the control group of *per se* states.

Nielsen categorizes each of the 1,025 product modules as being in one of ten product departments. It is useful to summarize the results for each of the 1,025 regression by this department type. This is shown for the most basic Smith and MacKay model in Table 17.1.

The results shown in Table 17.1 are somewhat striking. In 61 percent of the products studied, the estimate of β_3 was positive. It was significantly so in over 15 percent and significantly negative in less than 6 percent. The median price effect in the states historically leaning toward a Rule of Reason approach ranges from a low of 1.3 percent to a high of 8.6 percent. Moreover, these increases are typically associated with declines in the quantity sold. This strongly suggests that the greater national legal tolerance of minimum RPM agreements following *Leegin* has led to tighter supplies and higher retail prices in the Rule of Reason states.

Smith and MacKay (2013) recognize that higher prices by themselves do not necessarily mean that consumers are worse off. In the absence of RPM agreements, retailers might not hold sufficient inventory of high-cost branded goods as suggested above in Section 17.5 but, instead, hold more low-cost private label (unbranded) products. If this is so, then the market share of branded products in the Rule of Reason states should have increased after *Leegin* relative to that in the *per se* states. Yet Smith and MacKay (2013) estimate a second difference-in-difference effect to show that this has *not* been the case. In short, the Smith and MacKay (2013) study offers fairly strong evidence that the relaxation of the *per se* illegality rule for RPM agreements has led as many feared to less competitive pricing. Their evidence from market simulations suggests that this has reduced consumer surplus by about 4 percent on average.[14]

Table 17.1 Regression results for estimates of difference-in-difference parameter, β_3 (fixed effects)[15]

Product Department	*Number of Regressions*	*Number of Regressions with $\beta_3 > 0$ (Significant)*			*Number of Regressions with $\beta_3 < 0$ (Significant)*			*Percent Positive in Total*
		Count	Percent	Median	Count	Percent	Median	
Health & Beauty Aids	165	24	14.5%	3.9%	13	7.9%	–4.7%	59.6%
Dry Grocery	406	67	16.5%	4.2%	23	5.7%	–4.5%	63.5%
Frozen Food	81	23	28.4%	3.4%	1	1.2%	–6.7%	70.7%
Dairy	43	5	11.6%	3.1%	3	7.0%	–2.8%	59.1%
Deli	16	2	12.5%	2.6%	0	0.0%	—	75.0%
Packaged Meat	12	3	25.0%	1.3%	2	16.7%	–12.6%	66.7%
Fresh Produce	21	2	9.5%	8.6%	0	0.0%	—	61.9%
Non-Food Grocery	122	16	13.1%	1.8%	7	5.7%	–4.5%	53.6%
Alcohol Beverages	30	3	10.0%	4.0%	2	6.7%	–3.8%	43.3%
General Merchandise	129	12	9.3%	4.1%	7	5.4%	–4.1%	58.3%
Total	**1025**	**157**	**15.3%**		**58**	**5.7%**		**61.0%**

[14] Smith and MacKay (2012) run similar regressions using quantity as the dependent variable. Here, the difference-in-difference estimator is expected to be negative as actions that raise price lower the quantity demanded. This too is exactly what they find to roughly the same extent that they find the positive price effects.

[15] The significance level is 5% for the above regressions. Standard errors are clustered at the state level interacted with a dummy for post-Leegin to allow for arbitrary serial correlation. The authors have a more recent version of the paper in which they calculates significance via bootstrapping. Source: Calculated based on data from The Nielsen Company (US), LLC.

Summary

Because a manufacturer relies on retailers to get its goods to the market, the manufacturer must hope that the retailers will share its views about the appropriate price to consumers and the proper amount of promotional and other services to provide. Unfortunately, this is rarely the case. Double-marginalization and other problems lead to a divergence of interests between the manufacturer and the retailer. However, contractual agreements governing this vertical relationship can resolve some of these differences. Yet such agreements can also facilitate price collusion either among manufacturers or retailers. As a result, public policy regarding vertical restraints is complicated.

In this chapter, we have focused on one particular type of vertical restraint—a resale price maintenance or RPM agreement. Such agreements may specify a maximum price above which a retailer may not charge, or a minimum price that the retailer cannot discount. For many years, RPM agreements were considered anticompetitive and treated as *per se* illegal. However, starting as early as 1919, the courts have chipped away at this strict view so that now RPM agreements and behavior that closely duplicates such a contract even when the contract itself does not formally specify a retail price, are subject to a more flexible rule of reason. With *State Oil v. Khan* and with *Leegin*, the status of RPM agreements has changed from *per se* illegal to legal if reasonably justified. This is true whether the agreement imposes either a maximum or minimum resale price.

The reason that the courts have moved to a more lenient attitude toward RPM agreements is straightforward. Increasingly, economists and policy makers have understood that without such agreements, problems such as double-marginalization, insuring the provision of services to consumers, and dealing with demand uncertainty, work against consumer as well as producer interests. This is not to say that the concern that vertical price restraints may be anticompetitive is unwarranted. It does suggest, though, that a proper adjudication of the issues cannot be made until all the facts are known. In some ways, this is exactly what the courts recognized in moving from a *per se* illegal judgment to one based on a "rule of reason."

At the same time, the potential anticompetitive effects of RPM contracts are clear. Indeed, the supposition that such effects are dominant is heightened by the fact that historically, it has been retailers and not manufacturers who have lobbied most consistently against the *per se* treatment that dominated the first century of antitrust cases. It has also been these same retailers who have supported legislation such as the Miller-Tydings and McGuire Acts permitting such vertical price restraints. Recent empirical work by Smith and MacKay (2012) finds that the *Leegin* case has led to higher product prices precisely in those states that were predisposed to adopt the more tolerant federal court guidelines suggests that these anticompetitive concerns may be justified.

Problems

1. Suppose that a car dealer has a local monopoly in selling *Volvos*. It pays w to *Volvo* for each car that it sells, and charges each customer p. The demand curve that the dealer faces is best described by the linear function $Q = 30 - p$, where the price is in units of thousands of dollars.
   a. What is the profit-maximizing price for the dealer to set? At this price, how many *Volvos* will the dealer sell and what will the dealer's profit from selling the cars be?
   b. Now let us think about how the situation looks from the car manufacturer's point of view. If *Volvo* charges w per car to its dealer, calculate how many cars the dealer will buy from *Volvo*. In other words, what is the demand curve facing *Volvo*? Suppose that it costs *Volvo* $5,000 to produce each car. What is the profit-maximizing choice of w? What will *Volvo's* profits be? What price p will the dealer set and what profit will the dealer earn at *Volvo's*

profit-maximizing choice of wholesale price w?

2. Suppose in problem 1 that *Volvo* operates the dealership itself and sells directly to its customers.
   a. What will be *Volvo's* profit-maximizing price p? What will *Volvo's* profit be? Compare your answer to the answer you worked out in 1(b). Give an intuitive explanation for why the answers differ.
   b. Suppose instead that *Volvo* can impose an RPM agreement on its independent retailers. Will *Volvo* set a maximum or minimum retail price? What price will *Volvo* actually set?

3. ABC, Inc. is a monopolist selling to competitive retailers. It faces a constant marginal cost of 10. Demand at the retail level is described by $P = 50 - Q$.
   a. What wholesale price will maximize ABC's profit? What retail price will this imply?
   b. What will be the value of consumer surplus if ABC sets a profit-maximizing wholesale price?
   c. What will be the value of ABC's maximum profit?

4. ABC is still a monopolist selling to competitive retailers but it now discovers that if retailers supply customer services, demand shifts to: $P = 90 - Q$. Each retailer can provide the required services at a total cost of $400.
   a. ABC decides now to implement an RPM agreement with retailers. Under this agreement, what retail price should ABC specify? How many units will retailers sell at this price?
   b. What is consumer surplus under the RPM agreement?

5. Under the RPM agreement and the price specified in 4(a), what is the maximum wholesale price that ABC can set? What will its profit at this wholesale price be? Did adoption of the RPM agreement improve social welfare?

6. A significant number of the resale price maintenance cases that have been the subject of antitrust policy involve the pricing of such simple consumer products as Russell Stover candy, Levi's jeans, Arrow shirts, and Colgate toiletries. Who has the incentive for resale price maintenance for these products? Explain why.

7. In the antitrust case *Albrecht v. Herald Co*., the successive monopoly problem was created by the publisher granting an exclusive territory to the distributor. Could the problem have been solved by opening up home delivery to competition among several distributors?

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Appendix

MANUFACTURER'S OPTIMAL CONTRACT WHEN SELLING TO A PRICE-DISCRIMINATING RETAILER

We consider the optimal wholesale price r and fixed fee T that a manufacturer should select to maximize total profit when the retailer sells in two identical markets, one of which is a monopoly but the other of which is constrained by potential entry to sell at a price equal to the wholesale price. Given that there is competition in one market, $T = 0$, as any value of $T > 0$ would drive competitive retailers from the market. The problem is then the profit-maximizing choice for the wholesale price r. Recall that demand in each market is given by: $P = \text{A}–\text{B}Q$. Manufacturing cost is c. The retail cost is just r. Retailer profit maximization in the monopoly case implies:

$$Q_M = \frac{A - r}{2B} \tag{17.A1}$$

and a retail price P^D of

$$P^D = \frac{A + r}{2} \tag{17.A2}$$

The retailer's profit Π^R in this market will therefore be:

$$\Pi_M^R = \frac{(A - r)^2}{4B} \tag{17.A3}$$

Absent any franchise fee T, the manufacturer's profit Π_M^M derived from sales in the retailer's monopoly market will be:

$$\Pi_M^M = \frac{(r-c)(A-r)}{2B} \tag{17.A4}$$

In the competitive market, the price to consumers will be r and retail profit is zero. Output will be given by:

$$Q_C = \frac{A-r}{B} \tag{17.A5}$$

The manufacturer's profit Π_C^M from the retailer's sales in this competitive market is:

$$\Pi_C^M = \frac{(r-c)(A-r)}{B} \tag{17.A6}$$

For a given r at which retailers buy goods in both markets, the total manufacturer combined profits are:

$$\Pi = \Pi_C^M + \Pi_M^M + \frac{(A-r)^2}{4B} = \frac{(r-c)(A-r)}{B} + \frac{(r-c)(A-r)}{2B} + \frac{(A-r)^2}{4B} \tag{17.A7}$$

Maximizing this with respect to r yields the following necessary condition:

$$r = \frac{4A+6c}{10} \tag{17.A8}$$

with $A = 100$ and $c = \$20$, this yields the value of $r = \$52.0$ reported in the text.

EFFICIENT SERVICE PROVISION AND PROFIT MAXIMIZATION AT THE INTEGRATED FIRM

Total surplus from services is $\{A–[c+\varphi(s)]\}^2(Ns)/2$. The surplus-maximizing or efficient value of services s^* must therefore satisfy:

$$(A–c)/2 = \varphi(s^*)/2 + \varphi\prime(s^*)s^*. \tag{17.A9}$$

The integrated firm's profit is:

$$\pi(p,s) = p(A-p)Ns - [c+\varphi(s)](A-p)Ns \tag{17.A10}$$

Necessary conditions for maximizing the integrated firm's profit are then the joint first-order conditions:

$$\frac{\partial \pi(p,s)}{\partial p} = (A-2p)Ns + [c+\varphi(s)]Ns = 0 \tag{17.A11}$$

and

$$\frac{\partial \pi(p,s)}{\partial s} = p(A-p)N - [c+\varphi(s)](A-p)N - Ns\varphi\prime(s)(A-p) = 0 \qquad (17.A12)$$

Equation (17.A11) implies $p^{\mathrm{I}} = [A + c + \varphi(s)]/2$. Substituting this price into (17.A12) yields:

$$(A-c)/2 = \varphi(s^I)/2 + \phi\prime(s^I)s^I \qquad (17.A13)$$

The service level satisfying (17.A13) is the same as that satisfying (17.A9), that is, $s^I = s^*$.

SERVICE PROVISION AND PROFIT MAXIMIZATION BY COMPETITIVE RETAILERS

At any retail price $p = r + \varphi(s)$ consumer surplus is $\{A–[r + \varphi(s)]\}^2 Ns/2$. Maximizing this with respect to s then yields the service level under competitive retailing, s^C

$$(\mathrm{A}–r)/2 = \varphi(s^C)/2 + \varphi\prime(s^C)s^C \qquad (17.A14)$$

Because $r > c$ and $\varphi\prime > 0$, $s^C < s^I = s^*$. Competitive retailers provide less service than either the integrated firm or the socially optimal level.

18

Non-Price Vertical Restraints

In May 2012, Penn State University completed an agreement that assigned Pepsi the exclusive "pouring rights" at every fountain and vending machine at each of the university's nineteen campuses across the state of Pennsylvania. For the next ten years, the only soft drinks served at every athletic event, theatrical performance, university ceremony, and in every university-authorized dining service, snack bar, and vending machine at every Penn State school will be *Pepsi Cola* and other Pepsi products such as *Mountain Dew*, *Lipton* iced teas, *SoBe*, *Aquafina*, *Propel Zero*, and *Gatorade*. The agreement followed a similar agreement between Pepsi and the University of Delaware, and is one of a number university "pouring rights" contracts that Pepsi has collected. Coca-Cola plays this game, too. It has recently concluded similar exclusive beverage contracts with the University of Minnesota and Ohio State University. These cola wars do not stop at the college level. By some estimates, 80 percent of public schools have exclusive "pouring contracts" with either Coke or Pepsi, and these extend not just to vending machines, cafeterias, and sports events but even to the drinks offered at fundraisers such as bake sales and book fairs.[1]

The "pouring rights" contracts between schools and beverage companies are examples of non-price vertical restraints. In this case, the upstream manufacturer imposes a restriction on the downstream distributor. As noted in the previous chapter, non-price vertical constraints are traditionally analyzed separately from vertical price restrictions (and historically treated differently in the courts). Whether or not this distinction is legitimate, there is little doubt that non-price restraints are the more common. Lafontaine and Slade (2007) estimate that some sort of exclusive dealing covers one-third of sales by independent retailers in the US. Other non-price vertical restraints such as exclusive territories are also frequently observed. Yet while they have typically been analyzed separately, it is readily apparent that non-price restrictions raise basically the same issues as the vertical price restrictions present. On the one hand, these restrictions can serve as useful arrangements that enhance product quality (including services) and efficiency. On the other hand, they have an obvious potential for weakening competition. In this chapter we focus on the main vertical restrictions: exclusive dealing, exclusive selling and territories, and aftermarket restrictions.

[1] T. Philpott, "80 Percent of Public Schools Have Contracts with Coke or Pepsi," *Mother Jones.com* 15 August 2012; http://www.motherjones.com/tom-philpott/2012/08/schools

18.1 UPSTREAM COMPETITION AND EXCLUSIVE DEALING

As the soft drink and school examples above illustrate, exclusive dealing is a contractual agreement that restricts the behavior of the retailer. Essentially, the retailer is not allowed to buy (and then resell) brands that may compete with those of the manufacturer. Justifications for exclusive dealing agreements are typically based on the presence of conflicting interests between the manufacturer and the retailer. Unless some vertical restrictions can be imposed, such conflicts may lead to outcomes that hurt consumers as well as firms.

To understand this concern, we should first recognize that manufacturers often expend considerable resources promoting their products. Household products companies such as Procter and Gamble, cosmetic manufacturers such as Revlon, and appliance firms such as Whirlpool/Maytag, are just some of the many manufacturers that extensively advertise their products. Such advertisements may well increase demand for the manufacturer's brand. They may also increase demand for the product category in general.

Consider, for example, advertisements for *Tylenol*, the well-known non-aspirin pain reliever. Undoubtedly, such advertising helps raise the consuming public's awareness of both *Tylenol*, in particular, and of the benefits of non-aspirin pain relievers in general. Such advertising is expensive. To recover the cost of the advertising, Johnson & Johnson, *Tylenol's* manufacturer will have to raise *Tylenol's* price. We can easily imagine the following transaction between a pharmacy owner and a customer searching for *Tylenol*. When asked why she wants *Tylenol* the consumer will say because she needs non-aspirin medication for pain and fever. The pharmacist may say that *Tylenol* will work fine but that the pharmacy also can offer a lower-cost, unadvertised brand that is the chemical equivalent of *Tylenol*. The price of this alternative may not be a lot below the *Tylenol* price—just enough to persuade the customer to switch to this brand.

It is precisely because the pharmacist can sell the alternative non-aspirin pain reliever at a price relatively close to the price of *Tylenol* that the pharmacist has an incentive to inform the consumer of the alternative. From the perspective of *Tylenol*, however, the pharmacist is free riding on *Tylenol's* advertising. *Tylenol* now makes no sale even though it was the *Tylenol* advertising that may have induced the customer to ask for a non-aspirin pain reliever in the first place. There is then a vertical externality in which actions by the retailer have consequences that can adversely affect the manufacturer and vise-versa.

An exclusive dealing agreement offers a solution to this problem because it permits the manufacturer to prevent the retailers of its product from making such substitutions.[2] This is particularly important in the case of goods in which the retailer plays a role something similar to that of a doctor whose recommendation acts like an informal guarantee of the product's quality. Many intermediate goods sold between firms, e.g., chemical products, may have this feature. At the retail consumer level, automobile dealers are among retailers who may serve this function.

From an antitrust perspective, however, exclusive dealing can also be a means of suppressing competition. We showed in Chapter 13 one way that this could happen. There we discussed the Rasmussen, Ramseyer, and Wiley (1991) model illustrating how exclusive dealing requirements can prevent entry when there are important scale economies in upstream production. However, entry prevention is not the only way that exclusive dealing can limit competition. Such contracts can also be used to limit competition between

[2] Marvel (1982) is among those who have stressed this argument.

existing manufacturers. Foreclosure of a rival's product can give a manufacturer increased market power.[3]

The manufacturer will have to share the profit from that power with the retailer. In order to get the exclusive contract in the first place, a manufacturer will have to offer the retailer as much profit as its rival can offer. As Mathewson and Winter (1987) show, this consideration can greatly complicate the analysis of exclusive dealing. In particular, the manufacturer that gets the exclusive contract may only do so by offering to sell to the retailer at a very low wholesale price. In turn, this low wholesale price will translate into a low retail price. One issue is whether the fall in the retail price is sufficient to compensate consumers for the loss of the alternative products. In principle, welfare could improve despite the fact that the exclusive deal eliminates a rival product line from the market.[4]

Exclusive dealing can also serve to limit competition among retailers and manufactures, simultaneously. For example, suppose that there are two manufacturers selling to two retailers who are spatially separated but still operate within a given territory. Without any exclusive dealing, each retailer may offer both products. As a result, price competition between the two products or interbrand competition, will be quite fierce at each retail location. However, if each manufacturer signs one of the retailers to sell its product by means of an exclusive contract, then interbrand competition can be softened. Effectively, the exclusive dealing does not foreclose either good but it does inject an element of spatial differentiation between the two goods that did not previously exist.[5]

18.2 EXCLUSIVE SELLING AND TERRITORIAL ARRANGEMENTS

We now turn to a different aspect of exclusive selling that relates to territorial restrictions. These cases differ from our soft drink and school example in two important respects. Whereas the restrictions in that example were aimed at limiting *interbrand* competition between rival soft drink companies, exclusive selling and territorial arrangements are aimed at limiting *intrabrand* competition between downstream dealers. In this case, the manufacturer agrees not to sell the product through other retailers. For example, under an exclusive selling agreement, Wal-Mart might obtain the rights to be the only retailer permitted to sell Nuance speech recognition software *Dragon*. Similarly, in an exclusive territorial arrangement, Toyota may sign agreements with a number of Lexus dealers that it will not open a new outlet in within a given distance of these dealers. Note that in both cases, the restriction now falls on the upstream firm.

We know that retail competition can help manufacturers in so far as it reduces or even eliminates the double-marginalization problem. We may well wonder then why a manufacturer would ever sign a contract that limits such retail competition. However, the rationale behind such restrictions is relatively intuitive.

[3] The foreclosure analysis here and in Section 18.3 overlaps with models from Chapter 16. Similarly, the weakened price competition achieved by RPM agreements overlaps with our Chapter 14 analysis.

[4] The foreclosure argument has been a recurrent topic in industrial organization. Bernheim and Whinston (1990) show that when there are two brands produced by two upstream firms and a single retailer, there are no incentives to adopt exclusive dealing. The retailer will always be a common dealer of both products. In the case of several retailers, O'Brien and Schaffer (1994) and Besanko and Perry (1994) find that exclusive dealing is always adopted. However, in the last two models, foreclosure is explicitly ruled out.

[5] See Besanko and Perry (1994) for a model along these lines.