

Chapter 20: Advertising, Market Power, and Information

Learning Objectives

Students should learn to:

1. Identify several ways in which advertising increases the demand for a product:
 - a. Differentiates the product from substitutes so that a better match between consumer and product will occur and price differences will matter less.
 - b. Modifies the “image” of the product so that the consumer gets more utility from the same level of actual physical service.
 - c. Provides information about the product so that the consumer’s preferences for it are actually modified or provides information so that the consumer can better compare the product with their preferences.
 - d. Provides information so that the consumer is aware that the product exists at a certain location for a specific price.
2. Discuss stylized facts about advertising:
 - a. There is a positive correlation between advertising in consumer goods industries and profitability in these industries.
 - b. The pattern of advertising across industries (including advertising to sales ratios) has been stable over time.
 - c. High advertising to sales ratios tend to be linked with low price elasticities of demand.
3. Explain the incentives and disincentives for a firm to engage in fraudulent advertising and relate these to the time value of money.
4. Discuss why it may be difficult to prosecute firms for false advertising.
 - a. Verifiability of claims
 - b. Bankruptcy protection
 - c. Ability to disappear
5. Explain why the advertising to sales ratio for an industry is a more useful gauge of advertising intensity than the total dollars spent on advertising.
6. Explain how advertising may give a firm some monopoly power.
7. Discuss some of the fundamental problems for economic analysis if advertising actually changes fundamental tastes. The student will be able to relate this argument to one about the benefits of technological progress.
8. Differentiate image advertising from informational advertising.
9. Explain the Nelson model of quality signaling through advertising
 - a. Experience goods and the need to get consumers to try them
 - b. Importance of repeat purchases
 - c. Discount rates and the value of expenditures versus repeat sales later
 - d. Consumer’s rational reaction to high levels of advertising
 - e. Incentive for firms with very high price-cost margins and low quality products to advertise for a one-shot profit bonanza

10. Explain how price as well as advertising expenditures may be a signal of quality. The student will be able to explain the empirical literature that shows minimal positive correlation between price and quality.
11. Discuss ways in which advertising is a complementary good with the product to which it applies.
 - a. Crowd appeal effect
 - b. Information about how to use the product
12. Explain and contrast the following categorizations of goods and relate them to advertising expenditures.
 - a. Convenience goods
 - b. Shopping goods
 - c. Experience goods
 - d. Search goods

Suggested Lecture Outline:

Spend two fifty-minute lectures on this chapter

Lecture 1:

1. Costs and benefits of advertising
2. Some stylized facts
3. Truth in advertising, verification, and regulation
4. Conditions that encourage fraudulent advertising
 - i) purchase necessary to evaluate quality
 - ii) difficult to recover damages
 general data and views about advertising
 - i) useful information versus unneeded product differentiation
 - ii) fundamental and acquired tastes
 - iii) prisoner's dilemmas in advertising
5. Nelson model
 - i) need for initial advertising for experience goods
 - ii) advertising as a signal of quality
 - iii) Pricing as a signal of quality (Milgrom and Roberts)
6. Empirical facts on advertising (pricing) and quality

Lecture 2:

1. Advertising and monopoly power
2. Advertising as a complementary good
 - i) consumption externalities or the "crowd" appeal (snobbery) effect
 - ii) information effect and brand recognition
3. Advertising and crowd appeal
 - i) more utility from an advertised good
 - ii) spatial model with advertisement enhanced value
 - iii) finding the marginal consumer and the quantity demanded

4. Information flow and the probability of receiving information
5. Monopolist's profit maximizing choice of advertising
 - i) linear inverse demand with advertising as a price shifter
 - ii) Dorfman-Steiner condition and advertising-sales ratios
 - iii) low price elasticities and advertising intensity
 - iv) advertising sales as a ratio of elasticities and constancy of ratio

Suggestions for the Instructor:

1. Students are constantly bombarded by advertising. Use their experiences to generate a discussion about the benefits and costs of advertising. Some possible issues to discuss are:
 - a. How many leave the room or change the station when an advertisement comes on the television or radio?
 - b. How many can remember whether a "sentimental" greeting card advertisement was for Hallmark or American Greetings?
 - c. What is Nike advertising in a television spot that doesn't mention shoes?
 - d. How many believe that McDonald's has the most preferred French fries?
 - e. How many check the flyer at the front of the store before going shopping?
 - f. How many have bought at a blue light special?
 - g. What do they think is the point of the advertisement that says "image is everything"?
 - h. How many have watched an infomercial in the last two weeks, in the last month?
 - i. How many have seen a television advertisement for a local business in the last week? How many have seen a television advertisement for a national manufacturing firm in the last two days?
 - j. How many have read Consumer Reports before making a purchase?
2. The section on consumer fraud is fascinating to students. The material in the text is interesting and to the point. Don't get caught up in too much discussion in class on this point, or the hour of lecture will be gone with war stories.
3. The section on fraudulent advertising is an excellent place to discuss issues related to observability and verification. One could easily relate this material to a discussion of regulation in general. Other good examples are pollution control, regulation of a public utility, principle-agent problems, etc.
4. The nutritional value of food is a good topic on which to base a discussion of truthful versus fraudulent, versus unclear, versus non-verifiable, versus not easily verifiable, versus vague advertising. The current nutritional labels on most foods are partly a result of this debate.
5. The United States Department of Agriculture recently proposed a set of guidelines for "organically or naturally grown" food items. This has resulted in a huge debate with both consumer and producer groups opposing the guidelines. Discuss with the students why they think this is the case.
6. Engage the students in a debate about whether a particular advertising campaign is designed to point out a real advantage of a product (differentiation that should clearly increase demand) or to simply convince consumers that this particular brand is a better buy for the money. While few of these debates have clear answers, the discussion is interesting. Some possible suggestions are listed below.

- a. Quicker braking for a specific type of tire
 - b. Presentation of taste test data on French fries
 - c. Presentation of sales data on a cola product
 - d. Demonstration of close shave by sexy model
 - e. Testimonials by adults who still like a “kid’s” cereal
 - f. Laundry detergent commercial showing items washed with two different brands
 - g. Liquid soap commercial showing celebrity lathering themselves
 - h. Athletic apparel commercial showing big stars more or less in the nude
7. Conduct an in-class survey about how many students typically buy Kraft Macaroni and Cheese versus a house brand. One could also do this for toasted oat cereals, or pineapple chunks, or yogurt, etc.
 8. New products fit the experience goods model (Nelson) since the manufacturer must get that initial sale in order to get any repeat customers. Think about the advertising that a new retail outlet may elect for a grand opening, special introductory sale, etc.
 9. Students sometimes think of automobiles as an exception to the idea that search goods don’t have a lot of advertising since they are familiar with lots of television and magazine commercials for cars. Point out that the sales revenue of car manufacturers is also very large and that the data shows a low ratio of advertising to sales.
 10. Be sure to discuss the incentives for fraudulent advertising by a ‘fly-by-night’ firm with a high discount rate and large immediate profits. Food supplements are a good case in point.
 11. In discussing price as a signal, ask the students how many of them regularly shop for their clothes at KMART. Then ask them to close their eyes and ask the question again. Ask them how many of them tell their friends where they buy their clothes. Ask them how many of them selectively tell their friends where they buy their clothes.
 12. Carefully differentiate the difference between advertising that gives utility to the consumer versus advertising that signals what does give utility to a consumer.
 13. The model on crowd appeal is a nice application of the spatial model. It might be helpful to give a spatial problem on a homework assignment a week or so before this lecture to help the students review. The model is slightly different than the standard model because the consumers are ranked in order of preference instead of being located at specific distances from the product.
 14. One will need to carefully go through the probability of receiving a message in the information model. An example for a given N may be helpful.
 15. The model of monopoly advertising is a good example of a decision problem with two choice variables. The idea of two-step or conditional optimization is important. One might relate it to the cost min and then profit max problem of the competitive firm.
 16. Be sure to differentiate between the level of advertising services, S and the level of advertising expenditures, ST , where T is the constant marginal cost of a unit of advertising services. The text normally assumes that $T = 1$, so that this distinction is not important, but the students may get confused in some problems if the difference is not made clear.
 17. Remind students that elasticity is a slope (derivative) multiplied by a ratio of levels. Since they know the slope (derivative) for linear functions, they can always compute a point elasticity.
 18. Go over the four types of goods (convenience, shopping, experience, and search) and give several examples of goods that fit various combinations of categories.

Solutions to End of the Chapter Problems:

Problem 1

The information given provides point estimates for the demand elasticity and the advertising elasticity. Using the Dorfman-Steiner condition (equation 10.10) and the targeted level of sales one can find the optimal level of advertising. The Dorfman-Steiner equation is

Advertising Expenditure / Sales Revenue = $\frac{\eta_s}{\eta_p} = \frac{0.5}{2.0} = \frac{1}{4}$. Therefore, advertising expenditure = (sales revenue) / 4 = 5,000,000. So the firm should commit 5 million dollars to advertising.

Problem 2

(a) The demand elasticity is given by

$$\eta_p = -\frac{\partial Q}{\partial P} \frac{P}{Q} = \frac{1}{2} P^{-\frac{3}{2}} S^{\frac{1}{4}} \frac{P}{Q} = \frac{1}{2}$$

The advertising elasticity is given by

$$\eta_s = -\frac{\partial Q}{\partial S} \frac{S}{Q} = \frac{1}{2} P^{-\frac{1}{2}} S^{-\frac{3}{4}} \frac{S}{Q} = \frac{1}{4}$$

The advertising-to-sales ratio is given by

$$\frac{\eta_s}{\eta_p} = \frac{0.25}{0.5} = \frac{1}{2}$$

(b) The answer is no. The data is in terms of expenditure. As the cost of advertising goes up, the expenditure rises but the data is in terms of expenditure. Hence, cost as a percent of sales revenue doesn't matter.

Problem 3

(a) We get inverse demand by solving $Q(P,S)$ as a function of P . We can then get revenue and marginal revenue in the usual manner.

$$MR_Q = 11.6 - 0.002Q + 0.02S^{\frac{1}{2}}$$

$$MR_S = 0.01S^{-\frac{1}{2}}Q$$

(b) Now set the two equations for marginal revenue equal to the respective marginal costs.

$$MR_Q = 11.6 - 0.002Q + 0.02S^{\frac{1}{2}} = 0.002Q + 4 = MC_Q$$

$$MR_S = 0.01S^{-\frac{1}{2}}Q = 1 = MC_S$$

Now solve the first equation for Q as a function of S and plug into the second equation. This will give $S = 400$, $Q = 2,000$

The price is given by substituting Q and S in the inverse demand function. This will give $P = 10$

(c) Profit is given by substituting the optimal levels of P , Q and S in the expression for profit. With $P = 10$, $S = 400$, and $Q = 2,000$, it is clear that $Profit = 7600$.

(d) We compute consumer surplus by finding the area of the triangle between the vertical intercept and the market price and the inverse demand function. The vertical intercept is 11.6. The price is 10 and the quantity is 2,000. Verify that $CS = 1600$.

Problem 4

To do this assume that $S = 0$ in the above model. Price and marginal revenue with respect to Q are given by $P = 11.6 - 0.001Q \Rightarrow MR_Q = 11.6 - 0.002Q$ Setting marginal revenue equals

marginal cost, we obtain $Q = 1900$. Therefore, $P = 9.7$.

Profits are given by substituting the optimal levels of P and Q in the expression for profit. It is straightforward to show then that: $Profit = 7220$. $Consumer\ surplus = 1805$

Problem 5

The text postulates that the advertising to sales ratio will be high to convenience goods that are relatively inexpensive and frequently purchased. The text also hypothesized that the advertising-to-sales ratio for “shopping goods” that are infrequently purchased and expensive will be low since consumers will check other sources for information. Consider then each company in the above table.

Philip Morris Tobacco, beer, and food are purchased almost daily. Someone seeing a television ad or hearing a radio spot just prior to running to the store may well make an impulsive purchase of the product.

Johnson and Johnson and American Home Products These products are also purchased on a regular basis. Particularly for non-prescription drugs, consumer information is not often unclear and for some ailments, it is not obvious that any of the remedies really help. There is also quite a bit of brand competition in this area (Tums, Roloids, Mylanta, Axid, etc.). Firms will attempt to differentiate their product by creating specific market niches (Robitussin DM, CF, etc.). These are also experience goods in the sense that consumers may keep going back once they try them and like them.

Proctor and Gamble This is in the middle as far as the benefits of advertising. A product such as soap is highly differentiated and a small part of the budget so that advertising for this convenience good makes a lot of sense. But things like paper products and some food items may see little increase in sales due to advertising. Thus, the expenditures are not as large as for beer or tobacco.

General Motors Cars and truck are a classic example of a “shopping good” where advertising is only a small part of the decision information.

Kodak There is strong brand competition in photo supplies between Kodak, Fuji, and house brands. Consumers may be able to be swayed by effective advertising, particularly since the quality of a given roll of pictures is highly variable depending on the firm, the lighting, the skill of the person shooting the pictures, etc. The consumer may not have good data on what works well for them and advertising has a good chance of success.

Pepsico This is an intermediate case like Proctor and Gamble because of the wide variety of products produced. The bottled or canned soft drinks (especially main items like Pepsi-Cola, Mountain Dew, and Sprite) are in fierce price competition and so sales will be very sensitive to advertising. But fountain drinks and other products (like Coke’s Minutemaid) may be much less sensitive to advertising. In some ways one might think Pepsico would have larger advertising expenditures.

Sears, Roebuck & Co. Many of Sears’ products are things like washers, dryers, and refrigerators that clearly fit the “shopping good” category. The same would be generally true to computers and lawn mowers but these will have some advertising sensitivity. Things like clothes (the softer side of Sears) would be more in the convenience good category.

Problem 6

(a) Assume that marginal cost = 0. Faced with a room full of N potential customers, drawn at random, the firm will wish to set a price that maximizes expected revenue as this is the same as maximizing profit when $c = 0$. Let $F(p)$ be the cumulative distribution function of p . Hence,

$F'(p) = f(p)$ is the probability density. Expected revenue at any price p is given by: $p[1 - F(p)]N$. Maximizing this with respect to p implies:

$$1 - F(p) - pF'(p) = 0$$

Since the distribution of p is uniform between 0 and 1, $F(p) = p$, while $F'(p) = f(p) = 1$. Hence, profit maximization requires: $1 - p - p = 0$ or $2p = 1 \Rightarrow p = \$0.50$.

(b) The typical consumer will expect a price of \$0.50 when they arrive in the store. With probability 0.5, the style will not be one that they sufficiently like and they will not buy the good. However, the remaining half of the time, the typical consumer will find that she likes the product enough that she enjoys some surplus from it despite the fact that it costs \$0.50. Since her valuation of the product in these cases runs from \$0.50 to \$1, her average valuation will be \$0.75 and her average surplus in the cases in which she buys the product will be $\$0.75 - \$0.50 = \$0.25$. However, this surplus is realized only half the time. So, the expected surplus is $0.5 \times \$0.25 = \0.125 . This is just enough of an expected surplus to induce the typical consumer to sink the \$0.125 transport cost necessary to visit the store. If the search cost were higher, the market could collapse in the absence of any credible way for the firm to commit to a price less than \$0.50 when faced with a random group of consumers in its shop. If the firm is free to set any price it wants once consumers are in the store, \$0.50 is its optimum choice. At that point, the search cost is sunk and consumers will buy or not depending on their valuation of the particular style the store has. However, if the search cost is say, \$0.15, rational consumers will foresee this outcome. Realizing that once in the store they face a “hold-up” problem in which the store can charge a high price since the transport cost is at that point sunk, they will reckon that their expected surplus net of transport cost is negative and not visit the shop.

Problem 7

If the store owner can identify potential patrons with a valuation of her style that is less than \$0.50 then, conditional on this fact, she knows that in any group of randomly selected customers now coming to the store, the conditional distribution is uniform between \$0.50 and \$1. Profit maximization again requires that $1 - F(p) - pF'(p) = 0$. Here, $F(p) = (p - 0.50)/0.50$; and $F'(p) = f(p) = 1/0.5 = 2$. Hence, profit maximization requires:

$$1 - \frac{p - 0.50}{0.50} - \frac{p}{0.5} = 0 \Rightarrow 0.50 - p + 0.50 - p = 0 \Rightarrow 1 = 2p \Rightarrow p = \$0.50$$

The profit-maximizing price remains the same at $p = \$0.50$. However, the average valuation in the group of store visitors is \$0.75. That is, those who now visit the store in response to an advertisement now know with certainty that they have an average value of the style in stock equal to \$0.75. Hence, the transport cost can now be as high as \$0.25 without deterring these consumers from visiting the store.