

## INDUSTRIAL ORGANIZATION ADVERTISING

We will now examine another strategic variable available to firms, that of advertising.

# 1 Information, Persuasion, and Signalling

## 1.1 Persuasion versus Information

We can categorize goods in relation to advertising into two categories that would delineate the type of advertising that could be pursued,

1. **Search Goods** are goods whose features or characteristics can be ascertained prior to consumption. Examples of which are computers, and cars.
2. **Experience Goods** are goods whose features and characteristics can only be ascertained upon consumption. Examples of which are wine, and restaurant menus.

Looking at the categorization, you should realize that it was done because the associated advertising schemes or strategies are or can be different. Particularly, we can distinguish the type of advertising messages into,

1. **Informative Advertising** which relay pertinent information about a product's existence, characteristics, and sales conditions, and/or
2. **Persuasive Advertising** which is meant to change consumers' perception or preference for the product.

The principal reason for this distinction of advertising message is to allow us to examine the value of advertising to society, including both consumers and the firms. To the layperson, most would agree that there is substance, and value in informative advertising, but little in persuasive advertising. Although intuitively pleasing, it is not completely correct. If having celebrity endorsement of a firm's product does indeed raise sales and market share, then there is real value to the firm. Of course that analysis ignores the value to the consumer, if the product is nothing but a dud. Further,

since there is a full spectrum of products some of which are experience goods, it would seem the sole means of getting consumers to try their product is through persuasive advertising. In fact, persuasive advertising is **indirectly informative**.

## 1.2 Signalling

Just because an advertisement seems superficially to be nothing but a public chest beating session, does not preclude the idea that there is some informative content in there, besides of course the obvious fact that a celebrity might endorse it.

To see this, first notice that within any particular segment of experience goods, such as Shiraz wine in general, or Greek restaurants within a metropolitan city, there are differential in quality. Then if anything, we can perceive a multi-million dollar advertising message that declares that wine to be the best in the world, through perhaps a camera panning slowly towards a celebrity sipping on it, as a direct message that the wine is really the best, and that we should really try it. The alternative would of course be to let the random whims of consumer dictate when and where they would try it.

Within a one shot game scenario, the firm would engage in persuasive advertising in its market if and only if,

1. The market share that could be gained upon advertising is greater than the cost of production and advertising.
2. That the cost of advertising is too high for their competition.

However, if you think about it, a firm could always feign being producers of good products in a one shot game, steal the entire market, while producing a low quality product, and thereby raise profits. If the advertising cost for them is too high, it would likewise be too high for the firm that is intent on making a good product, if we assume, not unreasonably that the better the quality of a product, the greater the cost of production.

However, consider a repeated game among producers of experience goods. Given that consumers can consume the product several times over the lifetime of the good,

there are now additional concerns to the firm making the high quality product.

1. Firstly, the sooner they can persuade the consumers to try their product, the sooner they would realize the quality, and continue consumption, and thereby raising the lifetime profit of the firm.
2. They would do so if and only if the cost of production of the high quality good in each period, and the total advertising cost is less than the gain in revenue, and thereby raising profits.
3. That the cost of advertising is too great for a low quality firm to emulate (i.e. pretend to be high type), since now in considering lifetime profits, the low quality firm would realize that once consumers try their product they would never repeat their consumption. So that if the cost of production is higher than the gains from lying, they would not engage in emulating the high quality firm. Only when this final point is true are advertising messages on quality **credible**.

Taken together in the repeated game scenario, persuasive advertising offers a signalling mechanism to the consumers about the quality of their product. A **separating equilibrium**, where consumers would be able to tell high and low quality firms apart, consequently (indirectly) informative in nature.

### 1.3 Advertising Intensity

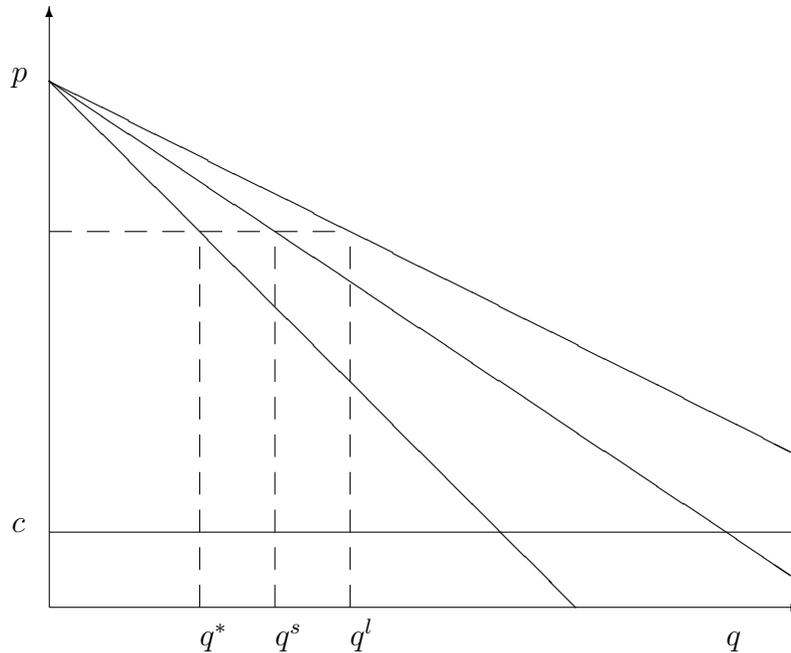
A way in which we can measure the intensity of advertising expenditure is with the **Advertising-to-Revenues Ratio** or  $\frac{a}{TR}$  where  $a$  is total advertising expenditure, while  $TR$  is the total revenue of a firm. This would obviously differ among firms depending on the type of product they manufacture, and the industry they belong to.

The key ideas are as follows pertaining to the factors that affect advertising intensity.

1. **The marginal gain to advertising is greater the more responsive demand is to advertising.** This point is self explanatory since it only makes sense for the firms to advertise more if they are able to affect demand through

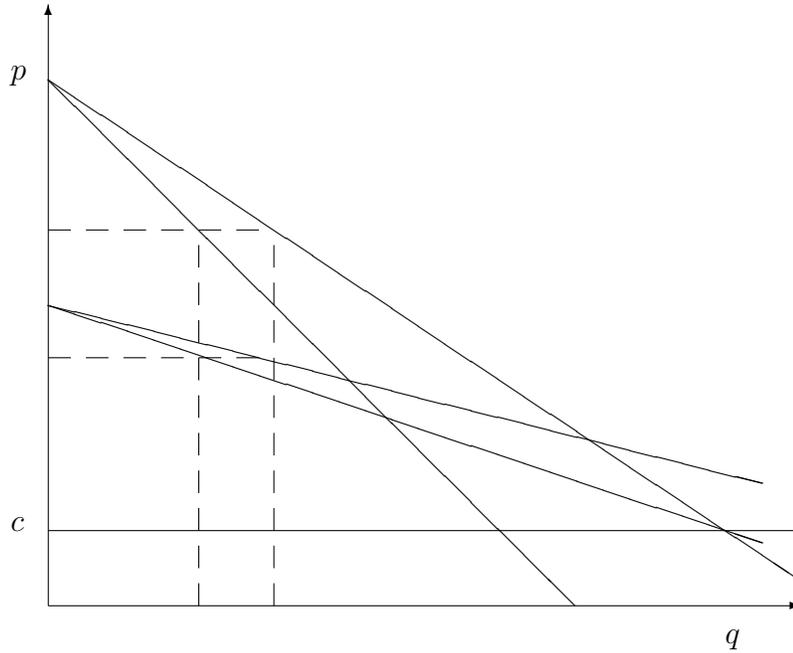
their advertising efforts. Diagrammatically, this implies a more advertising expenditure the greater the shift in demand as a result of advertising, as depicted below.

Figure 1: Advertising Elasticity & Returns from Advertising



- The marginal gain to advertising is greater the larger is the price cost margin which in turn is a function of the price elasticity of demand.** This point pertains to the marginal gain from the additional unit of the product sold. The gains from selling an additional unit is greater the greater is the margin from the sale, which in turn is dependent on the elasticity of demand that the firm faces for its product. This then means that the greater is the margin from a sale, the greater is the incentive to advertise. This is depicted below where we have two firms facing two elasticities of demand. Notice that in equilibrium, the firm that produces the same level of output but faces a more inelastic demand, has a greater price-cost margin. Given the same shift in quantity demanded, the profit gained from the shift is greater for the firm facing the more inelastic demand, and consequently would have greater incentive for advertising.

Figure 2: Demand Elasticity &amp; Returns from Advertising



The above two points are succinctly summarized by the **Dorfman-Steiner Formula**

$$\frac{a}{TR} = \frac{p - MC}{p} \eta = \frac{\eta}{\epsilon}$$

The condition can be easily derived from a firm's profit maximising choice. Let's assume that the inverse demand function is dependent on the total amount of total quantity produced,  $q$ , and total amount of advertising expenditure,  $a$ ,  $q(p, a)$ . In addition, assume a constant marginal cost,  $c$ . Then the profit function is,

$$\max_{p, a} \pi = (p - c)q(p, a) - a$$

Then the optimal choice of advertising is described by the following conditions,

$$\begin{aligned} q_p(p - c) + q(p, a) &= 0 \\ \Rightarrow \frac{\epsilon}{p} &= \frac{1}{p - c} \\ q_a(p - c) &= 1 \\ \Rightarrow \eta \frac{q(p, a)}{a} &= \frac{1}{p - c} \end{aligned}$$

Combining the conditions, we obtain,

$$\begin{aligned}\eta \frac{q(p, a)}{a} &= \frac{\epsilon}{p} \\ \Rightarrow \frac{\eta}{\epsilon} &= \frac{a}{pq(p, a)} = \frac{a}{TR}\end{aligned}$$

## 1.4 Market Structure & Advertising Intensity

We now ask the question regarding how does advertising expenditure vary with the market structure, i.e. how does it vary with advertising and price elasticities?

There are essentially two issues we have to consider here.

1. As we have noted, the lower the price-cost margin, the lower the incentive for raising advertising expenditure.
2. There is also the problem of advertising expenditure benefiting not only the firm that spend itself, but spill-overs that would be greater the greater the similarity between goods, which basically encourages **free riding**. In that sense, advertising expenditure is a public good.
3. On the other hand, there is the direct effect that advertising expenditure raising consumer awareness of the firms product, thereby increasing demand and the market share.

Given the above concerns we can imagine then that an industry characterized by a large number of firms, possibly having very similar goods would have a large price elasticity of demand, and consequently a low price-cost margin, which based on our previous analysis reduces the incentive for advertising, i.e. the optimal level of advertising expenditure is lower the larger the number of firms, which is reinforced by the public good/free riding effect of advertising in such industries.

On the other hand, the greater is concentration within a market, the greater is the ownership over the effects of advertising, which would raise own market share, thereby raising advertising expenditure.

Therefore as the number of firms in an industry increases, and industry concentration decreases, each 1. firm's margin decreases, 2. each firm captures less of the

demand increasing effect of advertising (free riding problem), thereby decreasing advertising expenditure. But 3. at the same time, there is greater incentive to attempt at capturing the demand shifting effect of advertising. The net effect as you may imagine is ambiguous. Empirically, there is some consistency in that, as concentration decreases from a high level, advertising intensity increases; and starting from a low level of concentration, advertising intensity decreases as concentration decreases.

## 2 Price Competition and Advertising

The above discussion has precluded concerns that advertising expenditure like price and quantity choices are in fact strategic choices that are available to the firms. Consider a possible manner in which two firms may interact with one another through strategic choices in advertising. Let the demand be constant, and assume that prices are likewise fixed in this example. Here advertising has no other purpose than to secure greater market share, of course assuming raising advertising raises market share. Then the incentive of each firm is always to “undercut” its competitor in advertising expenditure as long as there are additional gain, such that on the limit, firms would totally expend the margin on advertising. In this simple example here, the outcome in the use of advertisement is as in Bertrand price competition, and is rather extreme, and typical strategic interaction in advertising choice is not that severe.

Just as in price competition, the severity of competition can be averted through repeated interaction between firms. However, there are distinct features about advertising that makes cooperation difficult. Firstly, unlike pricing strategies, the frequency with which advertising strategies are changed is low. Secondly, the effect of advertising has a longer run effect. Both these reasons, if you would recall makes collusive equilibrium difficult. This then implies we should expect to see far greater expenditures on advertising than is optimal.

Unlike price and quantity which are not mutually exclusive choices since once one is determined, so is the other, advertising is quite apart from those strategic choices, which suggests that we might wish to consider the effect this choices, between the levels of price/quantity and advertising, have on each other.

## 2.1 Advertising Softens Price Competition

Generally, **advertising product characteristics increases product differentiation and softens competition**. Consider a simple example where two firms operate within a market, and both of them produce differentiated products from each other. However, the consumers in the market do not have complete information, and instead think of the two products produced as the same for all intents and purpose. Without advertising, and assuming that firms can only compete on prices, we would end up with a Bertrand Competition outcome. However, if firms use advertising as a manner in which to inform consumers of the true merits or differences, then they are able to create their own demand, and based on our analysis of the Hotelling Model, we know that when firms are perceived as different, they are able to price above the marginal cost, i.e. advertising increases product differentiation and softens competition.

However, common perception is that advertising creates artificial differential, that may not exist or is hardly any substance (which is interesting since if the differential is of no substance, why would consumers perceive the product as different), which leads to the argument that advertising is wasteful, anticompetitive and harmful. To economists, this accusations are hard to quantify, since how can we examine social welfare which is based on consumer welfare when the aim of advertising is to change preferences!

## 2.2 Advertising Intensifies Price Competition

We will now consider the diametric way in which prices and advertising expenditure might interact. Consider a market consisting of two firms producing the same product. Consumers are not aware of the prices set, but are willing to pay a maximum (willingness to pay) of  $p_{max}$ . Assume that the cost of searching exhaustively is exorbitant. Then the best strategy available to the consumer is to randomly pick a firm, check the price, and purchase it if the price is at or below her willingness to pay. Knowing this, the firms best response would be to price at  $p_{max}$ .

However, if the same industry were to begin to engage in **advertising of prices, price competition will increase**. What this would do in this industry is as we

discussed at the beginning of this section, where advertising competition would drive margins for the firms down to zero. Note that price will still be above the marginal cost of production, but in equilibrium profits are still zero. Why? **If advertising is detrimental, why do firms advertise prices?**