**Reading map:**

This lecture uses part of the content of Chapter 14 of the Carlton and Perloff text book, but also uses some material from the Waldman and Jensen book. The material covered in the lecture corresponds to pages 471-489 of the Carlton and Perloff text book.

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Barrier to entry – I 	This game demonstrates that advertising can be used as a strategy to keep out potential competitors. By now, you should be familiar with the way in which we find subgame perfect equilibria in such games.
Barriers to entry – II 	Sale increases with the amount spent on advertising, initially slowly but later at a more rapid pace. However, once advertising expenses reach a fairly high level, sale may not respond to it any further; it may flatten out or even decline. More importantly, since an incumbent spends on advertising for many years before the entry of the new competitor, it retains an edge in terms of sales even if the new entrant matches its annual advertising expenditure. Not surprisingly, therefore, advertising expenses can be pretty high in industries where there is no uniform standard, such that consumer perception can be influenced with advertising. Note that advertising expense as a percentage of sales is higher for industries such as liquor and toiletries than for industrial chemicals.
Product differentiation – I • Differentiated product in Bertrand competition • Price in equilibrium significantly higher than MC • Recapitulate: without product differentiation, P = MC in equilibrium	Rethink Bertrand competition in a context where the each firm spends on advertising to differentiate its product from that of the other. If the products of the two firms are not identical, at least in the perception of the customers, there will be no price war to reduce the equilibrium price to the level of the average (and marginal) cost. Indeed, unlike in the Bertrand model with a homogeneous product, it would now make sense for a firm to reduce the price for its product only if the other firm also reduces its price. The reaction functions of both the firms would, therefore, be positively sloped. The equilibrium prices, given by the point of intersection of the two reaction functions, will be positive.

Product differentiation – II
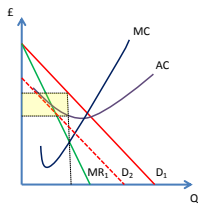
- Monopolistic competition
- Product differentiation implies market power, and hence downward sloping demand curve
- Firm earns positive economic profit in the short run, but zero economic profit in the long run
- Inefficiencies:
  - P > MC and hence deadweight loss
  - If profit maximising output is less than the output at which AC is minimised, there is excess capacity

In a monopolistic competition, there are a large number of firms, as in a perfectly competitive market. However, the firms are able to use advertising to differentiate between their own products and those of their competitors. Hence, unlike in a perfectly competitive market, they retain some market power, and their demand curve is downward sloping. In the short run, it is possible for a firm in a monopolistically competitive market to earn a positive profit, if the price in equilibrium (MC = MR) is higher than the average cost. However, in the long run, new firms can then enter, pushing the demand curve of the incumbents to the left, until price equals average cost, such that the long run profit is zero. If, in equilibrium, P > MC, the equilibrium output would be less than the output in a perfectly competitive market, implying the presence of deadweight loss. Additionally, if the equilibrium output is less than the output at which long run average cost is minimised, it implies that there is excess capacity. This follows from the premise that a firm would want to operate at an output level that minimises its long run average cost.

Product differentiation – III

- Is there too much product differentiation?
  - Welfare is the sum of consumer surplus and profits
  - If there is entry, there is an increase in consumer surplus, but individual firms ignore this and focus on their private benefits
  - If there is entry, there is a decrease in profits, but individual firms will ignore this as well, and focus on their private benefits
  - The outcome, therefore, is ambiguous; both too much product differentiation and too little product differentiation are feasible

- Example of inefficient product differentiation
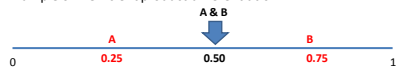
Transportation cost for consumers would have been lower if, in equilibrium, firms A and B did not end up in the middle

The first bullet is easy to understand: even if there is too much advertising from the point of view of the society, individual firms will continue to incur large advertising expenses. This is because individual firms do not incur the additional cost incurred by the society, but each firm expects to gain much more than the society. The second bullet was discussed in some detail in a tutorial. If you did not attend it, you can ask me more about it in person.

Product differentiation and adverse selection

- Consumers have an informational asymmetry vis-a-vis the sellers

- This can lead to market failure

- Example:
  - Used car market
  - 50% of cars are good, and 50% of them are bad
  - A good car is valued at £5000, and a bad car is valued at £1000
  - A rational customer would not pay more than £3000 for a car
  - Hence, there will be a market failure, i.e., there will be no trades in the used car market

- Do advertisements increase or decrease the likelihood of adverse selection?

Whenever there is informational asymmetry, for example, between producers and consumers, there is the possibility of market failure. The example explains the process of this market failure. An important question therefore is whether advertising reduces the extent of informational asymmetry by providing new information about the products, or whether it adds to informational asymmetry by providing information that is irrelevant or even misleading. There is no agreement about it as yet.

Expected impact of advertisement
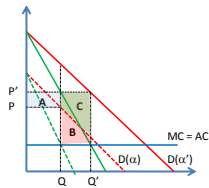
- Advertisement expenditure (E = α' - α) shifts demand curve from D(α) to D(α')
- Increase in profit
  - Initial amount (Q) at a higher price (P')
    = (P' – P)Q = **A**
  - Extra amount (Q' – Q) at price P'
    = (Q' – Q)P' = **B + C**
- Strategic question
  (α' - α) ? (A + B + C)
- Implication of economic theory
  - Marginal cost of advertising should equal its marginal benefit

A firm currently spends α dollars on advertising, and this has resulted in a demand curve given by D(α). It can increase its advertising expenditure to α' and increase the demand for its products to D(α'). Given the marginal revenue curve MC, the profit maximising output of the firm increases from Q to Q', and the increase in demand also results in an increase in price from P to P'. The firm's profit increases in two different ways: It can sell the earlier amount Q at the higher price P', such that the additional profit is A. It also sells an additional amount (Q' – Q) at the higher price, and the additional profit is (B + C). The firm therefore has to weigh the additional cost of advertising (α' - α) against the additional profit (A + B + C). Economic theory suggest that the firm will spend more on advertising until the marginal cost (α' - α) equals the marginal benefit (A + B + C). For details, refer to the section on "Profit-Maximizing Advertising", pages 477-480 of the Carlton and Perloff text book.

Welfare effects of advertisement – I
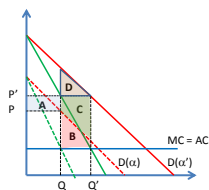
- D(α) represents pre-advertising preferences, and D(α') represents post-advertising preferences
- Advertising raises price to P' and quantity to Q'
- At pre-advertising preferences:
  - Increase in net social welfare
    = B – E
    (where E is the advertising expense)
  - Increase in profit net of advertising expense
    = A + B + C – E
- Implication: Private benefit of advertising to firms exceeds the social value of advertising

Once again D(α) is the initial demand curve of the firm, and D(α') is the demand curve after the firm incurs the additional advertising expenditure (α' - α). The increase in advertising expenditure increases profit maximising output to Q' and price to P'. We know from the previous slide that the increase in profits on account of the additional advertising expenditure is (A + B + C), and hence the net gain for the firm is (A + B + C – E) when E = (α' - α), the additional advertising expenditure. Suppose that advertising leads to a temporary increase in demand for a product, but does not change the actual preferences for the product. In other words, suppose that D(α) captures the true preferences of the customers. In that case, the additional advertising expenditure and the consequent increase in demand from Q to Q' results in social welfare by B. (This is the exact opposite of deadweight loss. Recapitulate that deadweight loss was the consequence of a decline in the amount bought and sold in the market, such that there were people whose willingness to pay was higher than the opportunity cost of supplying the product, and yet these people did not get served.) The net benefit to the society therefore is (B – E). Since (A + B + C – E) is always greater than (B – E), for positive values of A, B, C and E, we conclude that the private benefit of advertising to firms exceeds the social value of advertising.

Welfare effects of advertisement – II
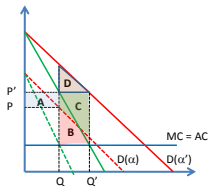
- Note also that the following can happen simultaneously
  A + B + C – E > 0
  B – E < 0

- But we cannot have
  B – E > 0
  unless we also have A + B + C – E > 0

- <u>Implication</u>: Society cannot benefit from advertising unless the firm's profit rises on account of advertising

- At post-advertising preferences:
  – Increase in social welfare
    = B + C + D – E
    ≈ B – E (if C & D are small)
  – <u>Implication</u>: For small changes in sales, net change in social welfare is roughly the same irrespective of whether or not advertising changes the preferences of the consumers

What if we believe that, contrary to what is mentioned in the previous slide, preferences of consumers do change on account of advertising, such that D(α' - α) reflects the true preferences of consumers after the additional advertising expenditure is incurred. In that case, the additional social benefit on account of the increase in the firm's output from Q to Q' is (B + C + D), and hence the net gain to the society is (B + C + D – E). If the increase in output (Q' – Q) is small, such that C and D are small as well, (B + C + D – E) is roughly equal to (B – E). In other words, for small changes in sales (or output), the net change in social welfare is roughly the same, irrespective of whether or not the additional advertising expenditure changes the preferences of the consumers.

Let us now do some algebra: (A + B + C – E) = (A + C) + (B – E). Suppose that the additional cost of advertising is higher than the additional social benefit on account of advertising, i.e., (B – E) < 0. If (A + C) is sufficiently high, then we can have (A + B + C – E) > 0 even when (B – E) < 0. In other words, even when the society incurs a net loss on account of additional advertising, the private firm may gain from it. Note now that if (B – E) > 0 then necessarily (A + B + C – E) > 0, i.e., when the society gains from additional advertising, it is necessarily true that the private firm gains from it. Another way of putting it is that the society cannot benefit from additional advertising unless the firm's profits rise on account of this advertising.

Is there too much advertising?

- Gains from advertisements
  – Increase in the size of the market
  – Increase in the market share of the firm advertising its product

- Implication
  – Advertising expenses are likely to be greater under oligopoly than under monopoly
  – Advertising expenses are likely to be (close to) zero under perfect competition

- Advertising expenses would have an inverted-U relationship with market concentration

	Firm B: High advertising expenses	Firm B: Low advertising expenses
Firm A: High advertising expenses	(100, 100)	(130, 80)
Firm B: Low advertising expenses	(80, 130)	(120, 120)

{*High*, *High*} is the dominant strategy equilibrium.

The key message here is that if a firm believes that a competitor will advertise to gain an advantage, then its dominant strategy will be to spend heavily on advertising as well. The consequence might be too much advertising. This is especially true in oligopolies where firms can gain significantly at the expense of their competitors. In a perfectly competitive market, a firm earns zero profits in the long run, no matter what it does. And in a monopoly the firm has power over the entire market anyhow. Hence in these two market structures the incentive to advertise is less than in an oligopolistic market structure.