

Monopolistic Competition, Oligopoly, and maybe some Game Theory

Now that we have considered the extremes in market structure in the form of perfect competition and monopoly, we turn to market structures that are more in tune with reality. The lack of market power under perfect competition is derived from the fact that all of the firms make the same product. Well in reality firms may make similar products, but they usually are not the same. That is firms differentiate themselves from other firms making similar products on other dimensions such as quality, branding, and other levels of product differentiation. Consider this, would you say a Saab sedan is the same as a Chevrolet Sedan, given they both have 4 doors, and other details. So by differentiating their product from other makers, each firm creates their little niche, and retains market power in that niche. Oligopoly is also similar however, where monopolistic competition has few barriers there are significant barriers for an Oligopoly.

Defining Market Structure

As you may imagine the definition of a market structure is dependent on quite a lot of factors, and arbitrary cutoffs. For example, what is the number of firms that really make up an oligopoly, as opposed to a monopolistic competition? What is the geographic sphere of influence or market we are talking about? We briefly mentioned this in the previous set of notes.

Canada follows the **North American Industry Classification System** which is a set of classification that categorizes firms by type of economic activity and groups firms with like production processes. Your text gives you the digit classification, and some examples of the others. As the number of digits increases the more precise the definition becomes. Broadly all firms are classified into 20 2 digit categories. 3 digit categories are sub-sectors, 4 digit industry groups, 5 digit industries, and finally 6 digit national industry groupings. Economists typically focus on 4 to 6 digit classifications. This still creates problems, consider the following a firm who is the sole firm, i.e. a monopoly under 6 digit classification may argue that it the right definition for it should be 5 or 4, and it is a oligopoly, not a monopoly! So who's right? We'll leave that to the lawyers. To give you a better idea, CNN recently reported that the Apple IPOD now holds 80% of market share, and if IPOD is a firm in itself, it could be construed as a monopoly, but of course the IPOD is only one of the many products made by Apple, and Dell is still the market leader in computers.

Measuring Industry Structure

Concentration Ratio: Percentage of the total industry sales by the top few firms of the industry. The ratio depends on your cutoff, top 3 or 4 or 5? Let s_i be the market share of each firm (Market share would be the amount of sales divided by the total sales of the industry). Let 1 index the largest firms, 2 is the second largest, and so on. The formula is just

$$CR(M) = \frac{\text{Total Sales of Top } M \text{ firms}}{\text{Total Sales for the industry}} \times 100$$
$$\Rightarrow CR(M) = \left(\sum_{i=1}^M s_i \right) \times 100$$

Herfindahl Index: Addition of the squared value of the individual market shares of all the firms in the industry. The formula is

$$HI = \sum_{i=1}^N (s_i)^2 = (s_1)^2 + (s_2)^2 + \dots + (s_N)^2$$

How does this index work? Because the function is convex, that is it gives a greater weight to larger numbers, if the industry is made up of a few large firms, and a lot of small insignificant firms, by squaring each of their market share would emphasize the power of the larger few firms.

In general, if CR is large, so would HI . The latter is typically used by government and economist.

These measures nonetheless are general measures as it ignores the facts that a lot of firms are conglomerates. You text gave you the example of Alcan. That is they can in fact operate across several industry. Consider the United Technologies Group which actually includes Carrier, Otis, Sikorsky and others. So how large are they. Individually they may be operating as an oligopoly, but as a unit, they sure seem large.

Monopolistic Competition

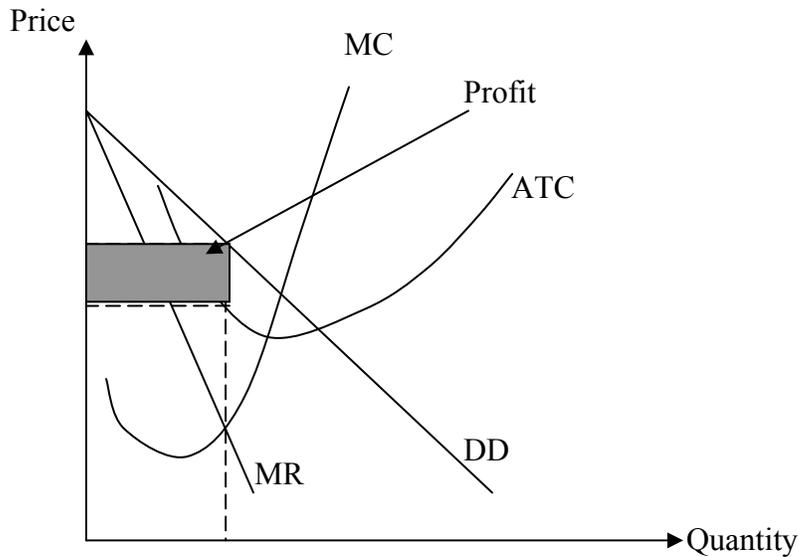
Characteristics:

1. Many Sellers: Implies each firm competes, and makes decisions independent of their competition (recall the perfect competition). Collusion is not possible since there are too many firms.
2. Differentiated Products: Now we relax our assumption that firms choose profit maximization through choice of output since competition dictates that they cannot affect prices. Note that product differentiation does not need to mean real differences, but may be a fiction created by advertising (Branding).
3. Multiple Dimension of Competition: Firms can choose the amount of advertising, change the color of packaging, offer new guarantees to give signal that their product is of high quality,...But in all this the firm is still maximizing profit, and the firm changes those dimensions of competition until they equate marginal benefits, and marginal costs.
4. Easy Entry

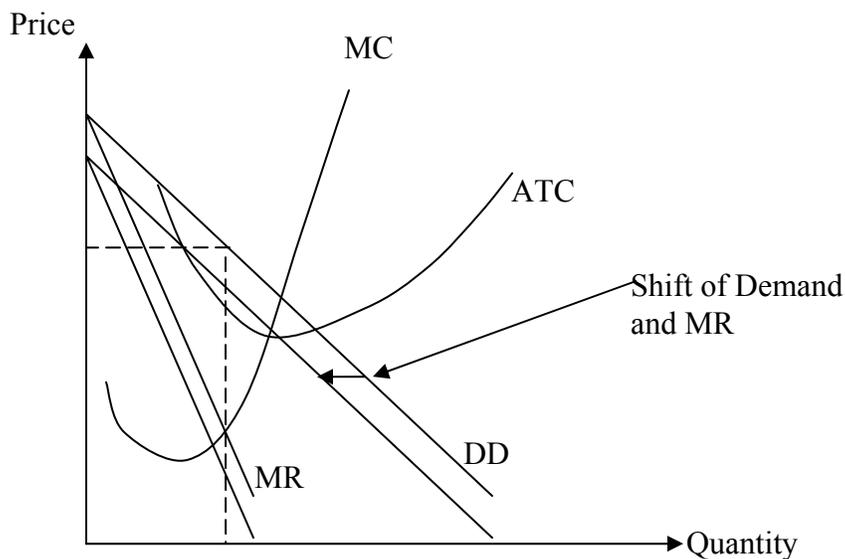
The combination of names should give you a hint of how the model would work. First because of product differentiation it is possible that firms have market power, and will have a downward sloping demand (but it is elastic because of competition, and limits its pricing power, i.e. if the product is priced to high, they would lose market share.), and they will produce at the monopolist's level of production as opposed to a competitive one. Second, because of free entry profits in the long run must be zero.

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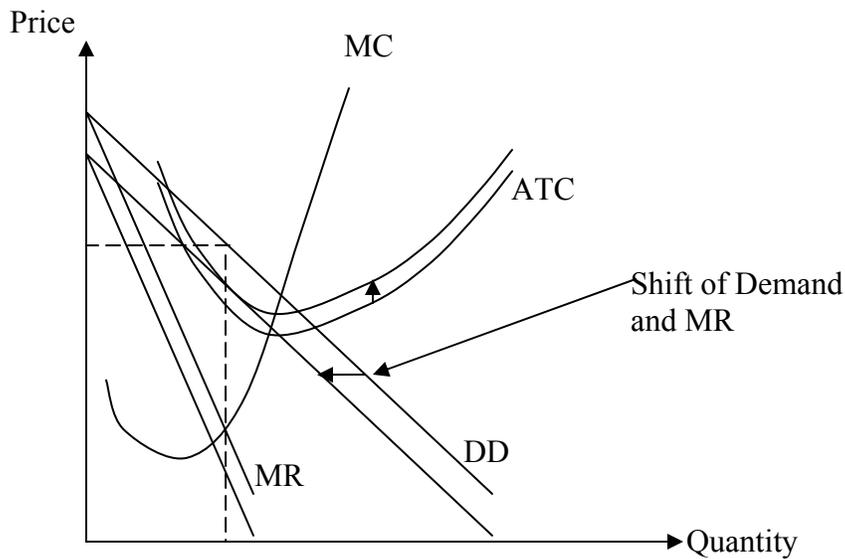
From our standard profit maximizing problem we get the profit maximizing condition that Marginal Revenue be equal to Marginal Cost. Diagrammatic representation of profits is as follows,



I will present this in slow motion. Now the firm is making profits, what this means is that firms will attempt to enter to grab a share in the profits. Some of their customers would shift their purchases to the new product, and hence shift the demand down.

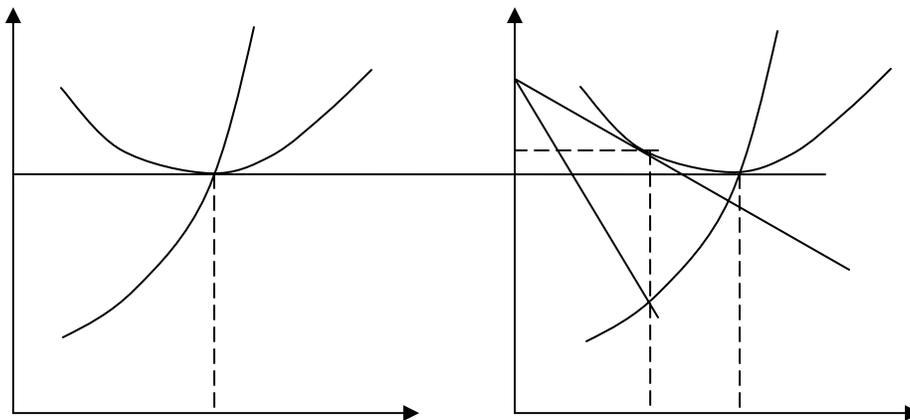


The incumbent firm would then counter this entry by raising for example its marketing campaign, thereby regaining some of the market share, but not without increasing its cost. This two activities eventually drives the firm to its long run equilibrium profit to zero.



In the long run equilibrium the ATC will be equal to demand, or as your book says, ATC will be tangent to the demand.

How does this market structure compare with the perfectly competitive market structure?



Based on the above diagram, there are still inefficiencies. And that because it has some market power, it can charge a higher price than would have been possible under perfect competition, and produces less quantity. However, note that because of the elastic demand, the price increase is small however the quantity change is large. At the monopolistic competitive equilibrium prices are greater than the marginal cost and

marginal revenue. Note that in both diagrams both firms are in long run equilibrium with zero profits.

Oligopoly

There is no strict “quorum” to the number of firms that make up an oligopoly. The sole identifying feature is that there need to be barriers to entry. Matter of fact there are several economic models that describe how oligopolies work, and none of them are exhaustive.

The Cartel Model

A Cartel is a combination of firms that acts as if it were a single firm.

The power of a monopoly comes from **barriers to entry**. If the firms in a particular industry are sufficiently small, there could either covertly or overtly “gang up” to prevent other firms from entering thereby earning positive profits in the long run just like a monopoly. Of course this entails each and everyone agreeing on their share of the pie (Which would lead us into bargaining if we wish to know how those portions are decided, which is not within our syllabus). So the **Cartel model of Oligopoly assumes that oligopolies act as if they were monopolists that have assigned output quotas to individual member firms so that their aggregate output as a cartel sums to the monopolist’s level of output**. Of course formal collusion is prohibited by laws in most countries and particularly so in developed countries. However, what is there to stop firms from covertly doing so, i.e. without ever meeting to discuss quotas? This is known as **Implicit Price Collusion**. This could occur in industries where you have one dominant firm with lower cost functions. In that case the dominant firm can choose its price knowing the others would not try to under cut it because they would not be able to afford a price war. This means smaller or fringe firms become **residual claimants** of whatever demand is left for their product once the leading firm makes its decision.

*** Read your text on sticky prices, page 288 to 289.**

Contestable Market Model

This model says that a firm’s price and output decision is a result of barriers to entry and exit and not on the structure of the market. Basically, the greater the barriers the greater is the industry insulated from competition, and the greater the price is above its cost of production.

A Primer on Game Theory

Although collusion is always a possibility it is in truth not an easily sustainable outcome. The reason is the following, if one party has full control of the entire market, their payoff would be strictly better. The easiest way to see this is through the classic **Prisoner's Dilemma**. Let there be two suspected accomplice to a crime. Let's say the crime is a major violation of a law, but evidence obtained could only convict both to minor charges. Let it be that if neither confesses, both get 12 months jail time. If one confesses, the chap who confesses goes free after testifying while the other gets 48 months. If they both confess, they would both get 36 months for the major crime. We can present these outcomes in a payoff matrix. The game is played as a one shot game. Everyone lays there bets on the table, and the strategy played will determine the payoff in equilibrium. Note the – sign is to emphasize that jail time isn't good times.

		Accomplice 2	
		Don't Confess	Confess
Accomplice 1	Don't Confess	(-12,-12)	(-48,0)
	Confess	(0,-48)	(-36,-36)

Let's examines each player's strategy in turn. In fact all we need is to pick one since the problem is perfectly symmetric.

Let's consider player 1. If he suspects his pal 2 to stay the course and don't confess, his best bet is to confess, since he goes free. If he suspects 2 would confess, his best bet is again to confess since that would mean he goes to jail for only 3 years as opposed to 4 years. So his best bet is always to confess. Note! No conscience needed!

The same thing goes through the mind of 2. The only feasible outcomes or Nash equilibrium is for both to confess, and end up with a 3 year sentence. The thing is they would have been better off with both not confessing, and both getting away with a light sentence.

How about when applied to firms?

Moving on to something a little more inline with what we have been discussing. Consider the following game. We have two firms. If they both colluded, say implicitly, they would get monopoly profits. Let that total be a , which could be shared between the two. If however anyone of them cheats, and lowers the price, they would get b , which is greater than $a/2$. However, when both cheats, they both get the long run profit c which is greater than 0, but less then $a/2$. In the payoff matrix, it is

		Firm 2	
		Don't Cheat	Cheat
Firm 1	Don't Cheat	$(a/2, a/2)$	$(0,b)$
	Cheat	$(b,0)$	(c,c)

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But the same arguments of before, both firms would always choose to cheat, even though they would have both been better off colluding. Another name for a 2 firm oligopoly is a **duopoly**.

It should be noted that the analogy above doesn't mean that we are interested in studying criminal behavior (albeit there seems to be increasing interest in the economics of crime!), nor does it imply that when placed in such situations, individuals necessarily behave as we said they would. Experimental economics has found mixed evidence. For a more detail examination of game theory, read "*An Introduction to Game Theory*" by *Martin J. Osborne*.