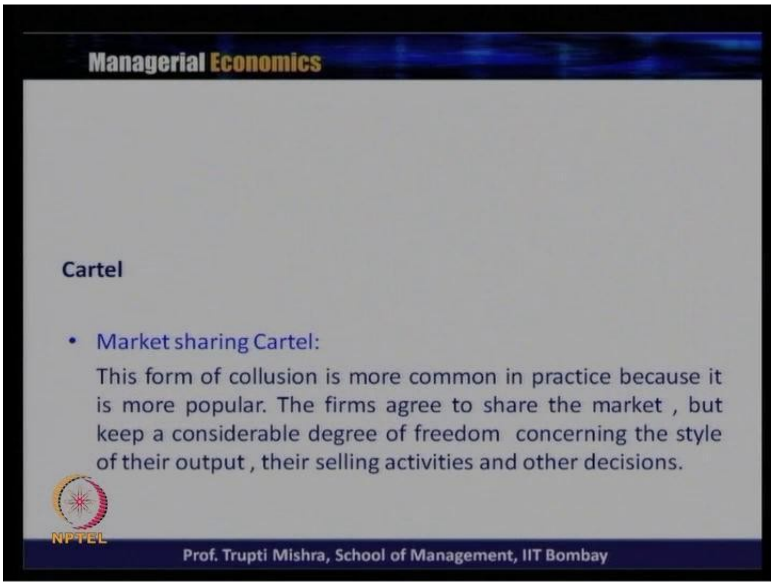
Managerial Economics
Prof. Trupti Mishra
S.J.M School of Management
Indian Institute of Technology, Bombay

Lecture - 66
Oligopoly (Contd…)

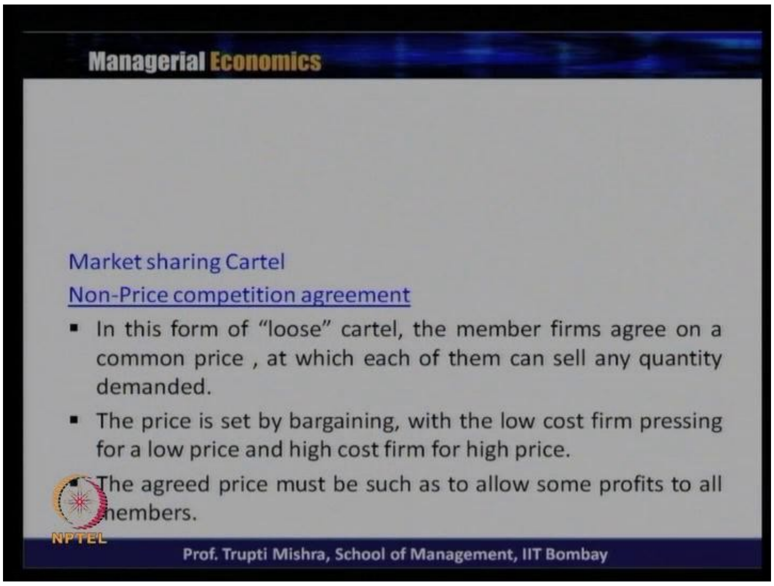
Now, we will come to the other type of market that is market sharing cartel. So, in a typical explicit collusion, one is cartel where it is a centralized cartel maximizing at the joint profit, then we have market sharing cartel, and here generally the collusion is to share the market and that is on the basis of the agreement on quota or some other basis on the geographical basis. In that case, they may charge same price; they may charge different price.

(Refer Slide Time: 24:54)



So, in case of market sharing cartel, if you look at this form of collusion is more common in practice because it is more popular. The firm agrees to share the market, but keep a considerable degree of freedom concerning the style of their output, their selling activity and other decision. So, they share the market, but still they keep some amount of freedom on the basis of their selling activity; how they are styling their output or may be some advertising advertisement strategy; they want to keep some freedom about that. So, they share the market, but they are they are also having some freedom when it comes to market their product; whether its selling whether its advertising or whether it is the presenting style of their output.

(Refer Slide Time: 25:46)



So, market sharing cartel, is again, it has two kinds: One is non-price competition agreement and second is market sharing sharing on the basis of the quota. So, in the typically the first kind where market sharing cartel when there is a non-pricing agreement competition agreement, in this form it is a loose cartel generally; the member firms agree on a common price at which each of them can sell any quantity demanded. So, member agree on a common price and there is no restriction that what quantity, what they are going to sell in the market.

Generally, this is known as a loose cartel because... We will see why this is considered as a loose cartel bit later after looking at the characteristic of a cartel in case of a non-price competition. The price is set by bargaining low cost firm pressing for a low price; high cost firm pressing for a pressing for a high price. So, the strength of bargaining decides how the price is going to be formulated. So, always the low cost firm, they press for a low price and high cost firm they press for a high price. The agreed price must be such that it allows some profit to all the members. So, whatever is the price decided by the market, at least it should give some amount of profit to both the high cost firm and the low cost firm. So, it has to be agreed commonly by both the high cost firm and low cost firm so that they get some amount of profit.

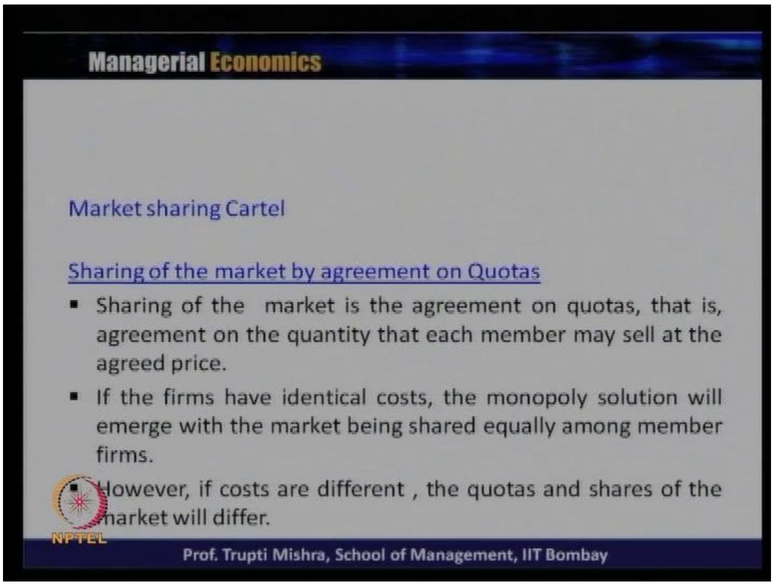
(Refer Slide Time: 27:16)

The firms generally they agree into the fact that they are not going to sell at a price below the cartel price. Whatever the price decided by the cartel, they are not going to sell before below any price below the cartel price; however, they are free to vary their style, their product, and their selling activity because they have some amount of freedom over there.

So, here the firm they are, even if they are in the collusion, they are competing on a non-price basis. Then what is non-price basis here? Non-price basis is when they are competing with each other on the basis of style of their product, their selling activity; may be it is even if they are the same, even if it is a same price, when the output pricing style is different, the consumer may get attracted to may be the firm 1 or firm 2 where in particular case they like the product.

By keeping their freedom regarding the quality, appearance of the product, as well as the advertising and other selling policy, each firm hopes that it can attain a higher share of market. So, even if they are charging the same price, they always feel that, since there is a freedom regarding the quality and appearance of the product, their selling activity and also with respect to the advertisement and selling policy, they always feel that they can attain a higher share of market, they can attract the consumer through all this non-price factor and they will capture a higher share in the market.

(Refer Slide Time: 29:04)



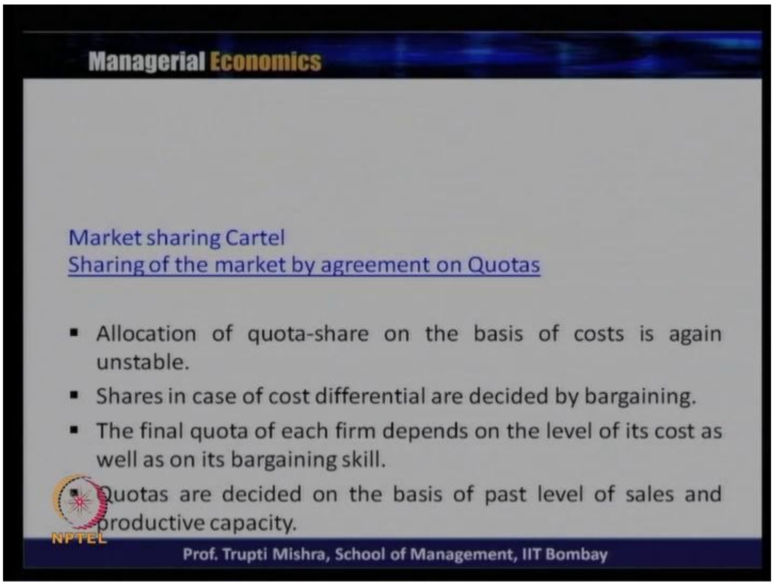
So, here if we look at, collusion is only on the basis of the price; for rest of the activity, there is no collusion; they can compete with each other on the basis of non-price factors. Then the second case, when the sharing of the market is on the agreement of the quotas; so here it is not non-price competition; here the market is share on the basis of the agreement on the quota. So, sharing of the market on the basis of agreement and quota is agreement on the quantity that each member may sell at a agreed price.

So, price is decided; there is a cartel price. And what is the again what is the collusion here? One is with respect to the price and second is what quantity each member is going to sell. So, here the collusion is with respect to price and also with respect to the market share. So, if the firm has identical cost, the monopoly solution will emerge with the market being share equally among the member firm. How this will become a monopolist if there is a identical cost, there are 10 firms in the market? 10 firms come into collusion and they decide two common things: one - what is the price to be followed in the market and second - what is the total quantity they are going to sell in the market.

So, if the entire market is divided into 10 segments and if they are going to continue that for a longer period of time, that segment one is by firm 1, segment two is by firm 2, segment n is by segment n. So, that segment 1 becomes in the segment 1 firm 1 become a monopolist because there are no competition for segment 1. Segment 10 firm 10 becomes monopoly because there is no competition, competitive firms entering into the segment 10. So, in long run generally monopoly monopoly solution emerges in case of a sharing a market on agreement on quotas or agreement on the quantity.

However, if the costs are different, the quota quota and share of the market will differ and this quota is not uniform or the share of the market is not uniform. Basically, the low cost firm they will get a higher share and the high cost firm they will get a lower share because low cost firm is attaining the cost efficiency; they can produce a higher amount of the output at a lower cost. So, they will always bargain for a highest market share and they can get the profit through the more market share rather than the increase increase or decrease in the price because of price cartel price is remain cost and all the firms, they have to follow it.

(Refer Slide Time: 31:28)

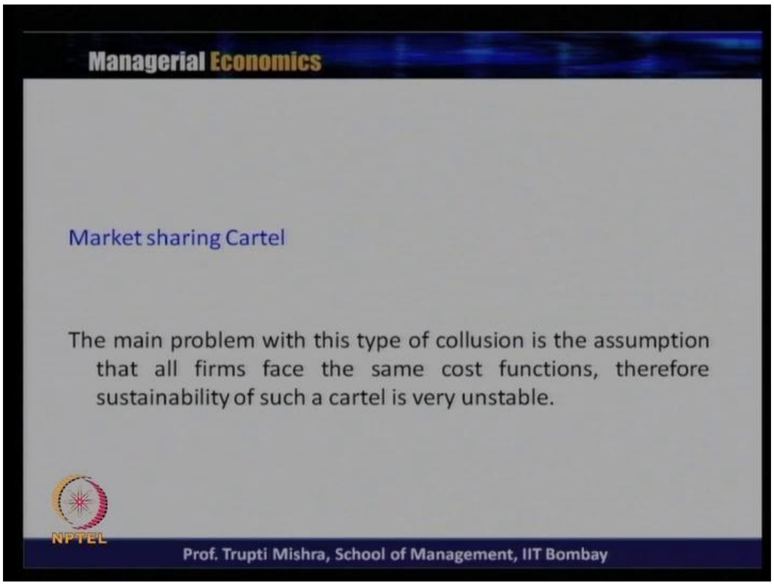


So, in this case, when the allocation is done, the allocation of quota or the share on the basis of the cost is again unstable. So, if we look at, if it is identical cost, the share is all right, if the allocations are equal. But if it is not uniform cost, if the cost differential is there, generally this share on the basis of cost is again unstable, because in the time in the deferent time period the possibility is that the cost function of the firms will change. The high cost firm in a long run they may become the low cost firm and if the allocation is on the basis of the cost, it may not suite them or they may not like to be the part of the cartel.

So, share in the case of cost differential are decided by bargaining and the final quota of each firm depends on the level of its cost as well on its bargaining scale. So, when it comes to the final share, what the market should get or what the firms should get individually, that depends up on the bargaining skill. So, one is the cost function; second in second one is that what is bargaining skill of the firm? If the bargaining skill of firm is good, they get a higher share and if even if they have a good cost function, if the bargaining skill is less, generally, they get a lowest market share.

So, there are two factors here to decide the market share. It is not solely on the basis of the cost function; also, it is on the basis of the bargaining power of the firm. The quotas are again decided on the basis of the past level of sales and their productive capacity. So, productive capacity is decided on the basis of the cost function and the cost function and how cost effectively they are producing, and second is what is their past level of sales. They generally look at the trail of the sales; what they have done in the previous years because that gives the credibility of the firms to produce and sell in the market. So, the when the market share is decided for the different firm, the cost function, how productive is that firm, what is their past level of sales because that gives the credibility of the firm in the previous period, and also what is the bargaining skill of the firm.

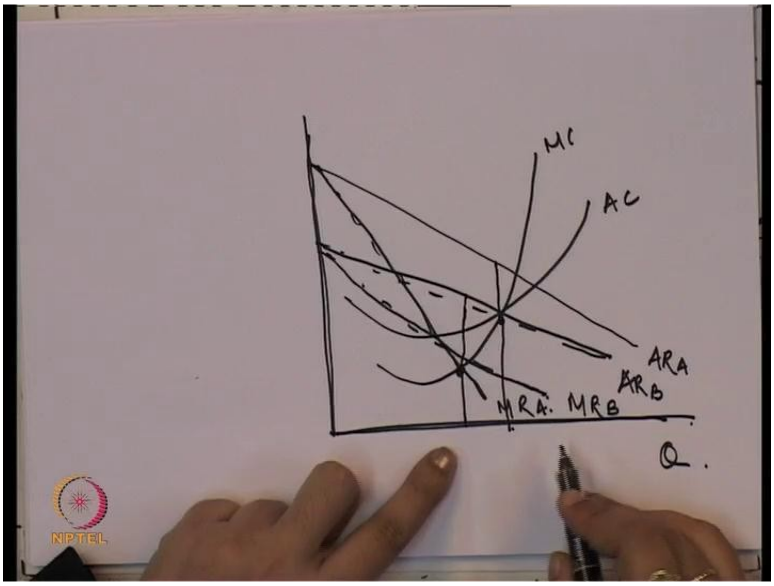
(Refer Slide Time: 33:50)



So, on this factor, on this by on this basis of this factor, generally, the share of the market is decided, but what is the main problem with this kind of collusion? The main problem with this of collusion is that all the firms, they face the same cost function. Therefore, the sustainability of such cartel is very unstable because as we are discussing before couple minutes that the cost function cannot be identical for all the firms, because all the firms they have entered into the market in the different time period. So, some of them, they are operating in the short run; some of them operating in the long run. Those who are operating in the long run, if you look at, they are almost started to operating as the low cost firm because they have achieved the economy of scale through the scale operation, but those who have entered it later, they will always operate it at a high cost firm.

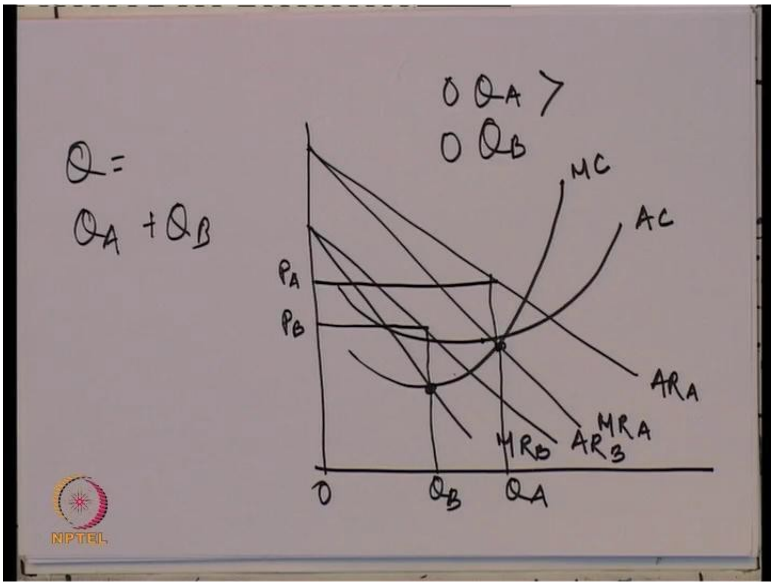
And also about the productivity of the firm, that decides that what type of cost function they are operating. So, when the sharing is on the basis of the cost, it remains unstable and this cannot be, this cartel cannot be sustained for a longer period of time. Then we will see, we will just a graphical explanation of this market sharing cartel and then we will discuss few factors which which talk about that; what is the requirement or what generally goes wrong if the cartel is not sustainable for a longer period of time .

(Refer Slide Time: 35:14)



We are assuming a case of duopolist here, for graphical explanation in case of market sharing cartel. This is our marginal revenue for the firm A, this is the average revenue of B and correspondingly we also get the marginal revenue of B. So, average revenue A and marginal revenue A is the average revenue and marginal revenue for firm A; average revenue B and marginal revenue B is the average revenue and marginal revenue for firm B. Then we will look at the average cost which is common to the firm, common to both the firms because we assume the identical cost and we look at the marginal cost function and we will identify two points where marginal cost function is marginal cost function is intersecting the marginal revenue function.

(Refer Slide Time: 36:54)



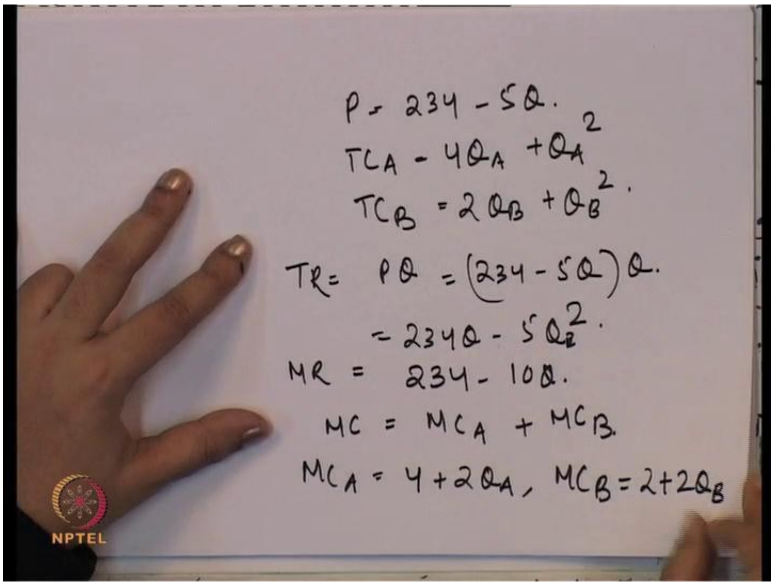
So, correspondingly we get two points and also the two levels of price. So, we get this is marginal revenue of A. We will just change the figure; its looks a bit clumsy; we will just start it fresh. So, we have average revenue of A. We have marginal revenue of A; then we have average revenue of B; we have marginal revenue of B. We have the average cost which is common to both marginal revenue and common to both firm A and firm B. Then we have marginal cost which is again common to firm A and B.

We will now identify two points: one where marginal cost is equal to marginal revenue A; second, when marginal revenue is marginal revenue is equal to marginal cost is equal to marginal revenue of B. Correspondingly we get one B here price and we also get one more price that is on the basis of the marginal revenue of A. So, this is price A; this is price B. So, if you look at, here this is Q_B here it is Q_A. So, firm A is producing Q_A firm B is producing Q_B; the total output is equal to $Q = Q_A + Q_B$.

Now, same cost function, but if you look at, firm A is producing more than firm B. Why it is producing more as compared to B because it is at a different cost function, it has a different revenue function as compared to the B; so cost function is same; identical cost function. On the basis of their bargaining skill, on the basis of the past level sale, on the basis of their productive capacity, they are producing a producing a higher level of output, as compared to the lower level of output.

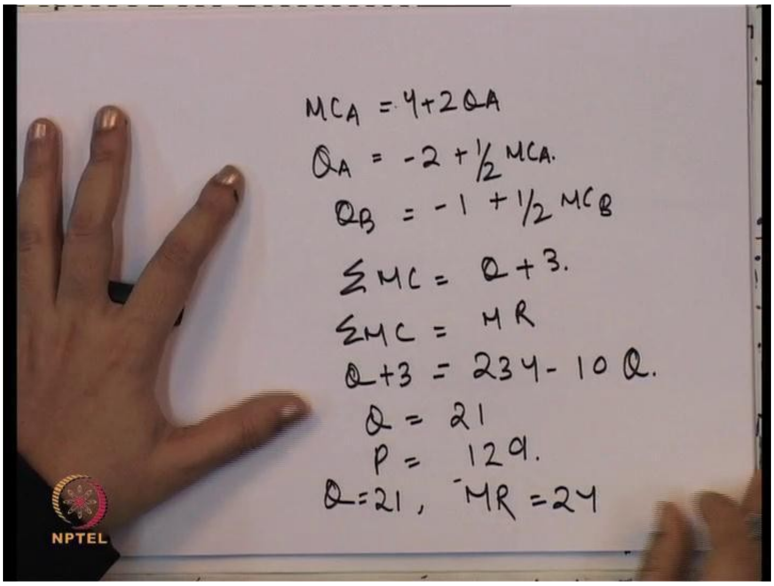
Now, this price if you look at, price is again two different levels. So, this may be the price will come in between that is P_A is the price decided by firm A; P_B is the price decided by firm B, but neither P_A or P_B can be the cartel price; the cartel price has to be decided on the basis of bargaining power of both Q_A and Q_B, and the cartel price is such that at least it will get some amount of profit. So, market sharing cartel is one, where it is, the share is on the basis of the share is on the basis of the productive capacity of the firm, the cost function of the firm, and what is the bargaining power of the firm.

(Refer Slide Time: 40:22)



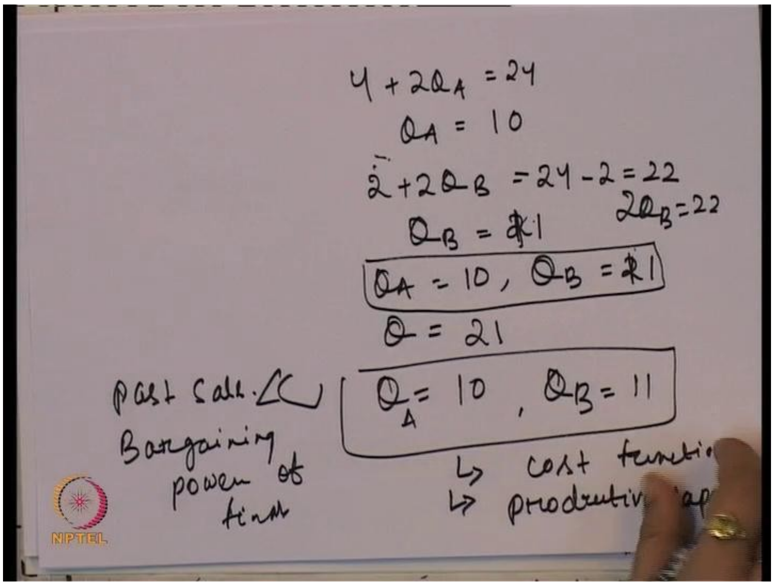
Then, we will take a numerical to understand this market sharing cartel. This is the demand function. We will take a separate function cost function here for $TC_A = 4Q_A + Q_A^2$, this is $TC_B = 2Q_B + Q_B^2$; total revenue should be equal to $TR = PQ = (234 - 5Q)Q$. So, that comes to $234Q - 5Q^2$ and marginal revenue is equal to $MR = 234 - 10Q$. Then will find out the marginal cost; marginal cost, ideally it should be equal to marginal cost A plus marginal cost B. So, marginal cost A is marginal cost marginal cost A is $MC_A = 4 + 2Q_A$ and marginal cost B is $MC_B = 2 + 2Q_B$

(Refer Slide Time: 42:26)



So, we have marginal revenue, we have marginal cost 1 and marginal cost 2. We can find out the total marginal cost by taking the summation marginal cost 1 and marginal cost 2. Then we can equalize with M R to find out the output level, to find out the price and also to find out what is the output level of both the firms. So, if $MC_A = 4 + 2Q_A$, then Q_A can be equal to $Q_A = -2 + \frac{1}{2} MC_A$; $Q_B = -1 + \frac{1}{2} MC_B$ and since marginal cost is equal to this 2. So, this has to be Q plus 3 and equalizing marginal cost equal to the marginal revenue Q + 3 is equal to the marginal revenue which is equal to the 234 - 10Q, what we have calculated earlier. So, will get Q is equal to 21 and P is equal to 129; so Q is equal to 21; M R equal to 24.

(Refer Slide Time: 43:34)



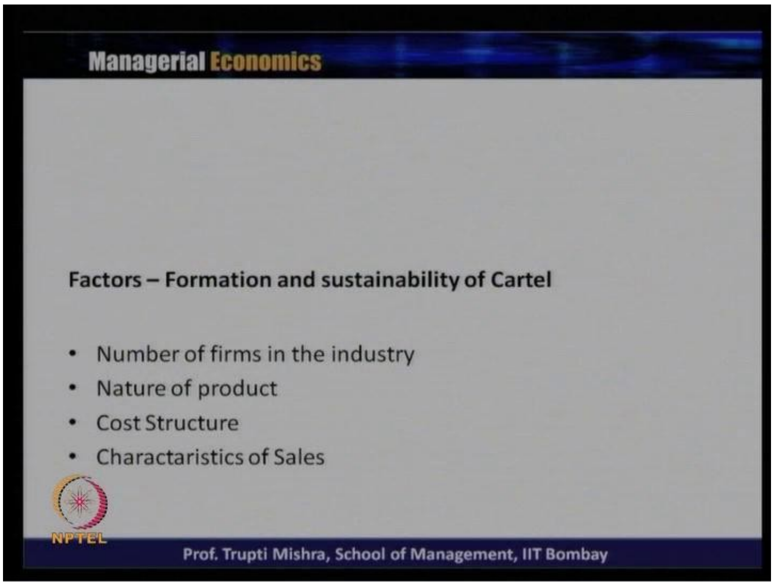
Then, we will find out the marginal cost of A and marginal cost of B equal to M R. So, $4+2Q_A=24$; $Q_A=10$; similarly, for marginal revenue, marginal cost B, we will find marginal cost which is $2+2Q_B=24$ and $Q_B=21$. So, Q_A is equal to 10, Q_B is equal to 21 and Q equal to as whole… this is Q_B equal to $Q_B=11$ because this is 24- 2 = 22; so $2Q_B=22$; Q_B equal to 11. So, if Q_B is equal to 11 and Q_A equal to 10, then Q_A+Q_B has to be equal to 21. So, now, if you look at, Q_A is just producing 10 and Q_B is just producing 11, but still they are in the same cartel because they are agreed to share their market, and so Q_A will go producing 10 till the time the revised output plan is not there from the cartel and Q_B is going on producing 11 units.

And how they get 10 units or 11 units? This is again on the basis of their cost function, at what cost they are operating, on the basis of the productive capacity and also on the basis of their past sales, how much they have sold in the last time period and also in the main important is the bargaining power of the bargaining power of the firm. So, if we look at, the market sharing cartel is one where there are the two types of market sharing cartel: one is non-price competition and second is marketing share on the basis of the agreement on the quota. So, in the case of non-price competition, they generally compute each other on the basis of non-price because they have the common price is agreed, the cartel price is agreed by all the firms, but they have some freedom with respect to the style of the output, their selling activity, advertisement. So, some activity which is non-price factors there, they have some freedom regarding that. So, generally they will compete on the basis of the non-price factors in case of the non-price competition, and whatever the price decided on by the market that has to be same.

The second case, where there is a market share on the basis of the quota by different firms, the quota is decided on the basis of the cost function, on the basis of the productive capacitive of the firm, on the basis of the bargaining power, on the basis of that on the basis of that typically what is the past level they have, what is the past experience in selling the product. And on that basis when the quota is decided, generally it leads to monopoly kind of situation in the longer run because the same person is get by sold by the or get capture by the similar of firm for a longer period of time, and that leads to a monopoly situation in that segment, because it is a since this is a common agreement that that share is given to typical firm; none of the other firms will enter into the market even if that firms is getting a super normal profit or the environment of the market is conducive for the other firms to enter into the market.

So, in case of collusive Oligopoly, we discussed two kinds of models; one is cartel and second one is the second second is cartel, and in the case of cartel we got two type of cartels; one is centralized cartel and second is the market sharing cartel. Let us discuss that why the cartel is not considered legal and why cartel is, particularly if we look at, why it never sustain for a longer period of time.

(Refer Slide Time: 47:58)



There are some factors that generally contribute to the formation and the sustainability of the cartel; the first factor - the number of firms in the industry. If there are more number of firms in the industry, generally forming a cartel and also the sustainability of the cartel is also questionable because a small group can work together; a large group working together is difficult because they operate in the diverse conditions when it comes to demand, when it comes to revenue, when it comes to cost, when it comes to their inputs, when it comes the raw material.

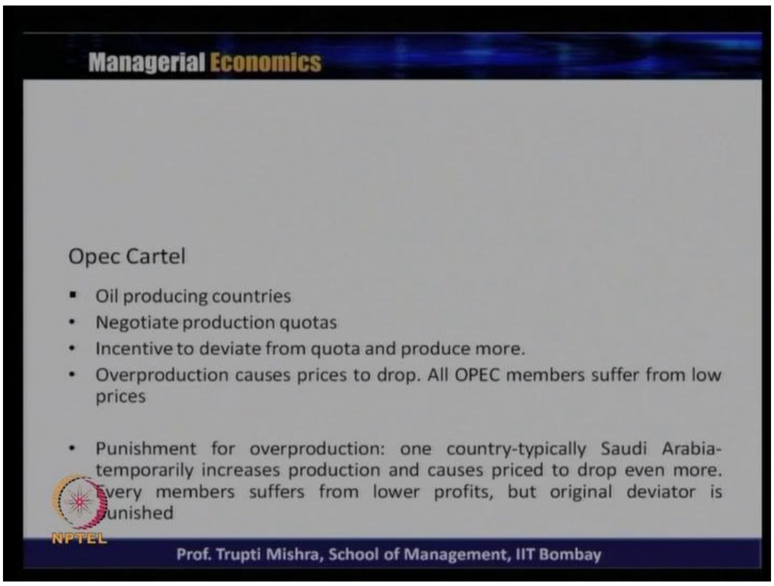
So, since there is diverse conditions emerge from the large number of firms in the market, when the number of firms is more in the market, forming the market and even sustainability of the cartel is also difficult. Then second factor for the responsible for the formation in sustainability of cartel is the nature of the product. If the nature of the product is homogenous, generally the cartel goes for a longer time period, and, but if the nature of product is not homogenous, if it is different from each other, in this case generally again forming the cartel is difficult and also sustaining the cartel is also difficult.

Cost structure: If it is in the same range, it is uniform range, again formation is easy and the cartel will sustain for a longer period of time, but if the cost function are different and they have to accept a price what is decided by the cartel, generally the cartel goes into the loose end because the high cost firm always feel that the difference between the price and cost of production which is getting narrow down and they will try to cheat the other firm in the market and they will try to sell their product a higher price and with the some product differentiation and that is why the cartel may end.

And also it may happen that some low cost firm, if the price is set on the basis of a higher deference between the cost of production, and cost of production and the price, they generally try to break the cartel price and sell it at a lower price so that they can get a good amount of market share and which will maximize the profit. Then last factor is the characteristic of sales, and characteristics of sales depends on what kind of sales of this product or what is the activity followed or what is the strategy followed; that leads to the formation and also that will decide what is the sustainability of the cartel.

Till now, if we look at, there is only one legalized form of cartel in the world economy and after that you find there is number of tacit collusion, but when it comes to explicit collusion, it is not legal; may be company they form, they collude, they form a cartel, but that is not explicit, rather that is tacit, but the one one example, till now that is valid in case of explicit in case of collusion is the opaque that is organization of petroleum and petroleum of producing country.

(Refer Slide Time: 51:20)



And this cartel is generally the group of people, those who are producing the oil. These are oil producing countries; they form a cartel; they negotiate on the production quotas. Typically, it is market sharing cartel and there is an incentive to deviate from quota and produce more in the form of market, in the form of cartel to found that there is a incentive to deviate from quota and produce more and that leads to the factor there is over production, over production in the market which reduces the price. All though OPEC members have to suffer the low price and generally the cartel broke over there. So, initially, the cartel was formed as a market sharing cartel where all though firms there will never share the quota and they will only produce that much amount of the oil.

But in the longer run, it happens that there will, there was incentive deviate from the quota and produce more. And some of the members, when they followed that, and when the member they followed that, that lead to over production. And over production, whenever there is a overproduction, that leads to the mismatch within the supply and demand; that lead to the drop in the price.

As a whole, all the OPEC member has to suffer the lower price and that is the time the cartel actually broke down. OPEC, as famous cartel is OPEC, that has broken down and the punishment for over production is one country, typically in Saudi Arabia, temporally increased a production in cost and price to drop even more; even member, suppose lower profit and the original deviatory is punished.

So, at the end, may be the punishment is different part, at the end the cartel did not continue. The cartel could not sustain because of the group behavior of the firms; Oligopolies firm in the cartel. They did not trust each other; they were trying to debate from the quota; they did the over production which mismatched the demand, supply and reduces the price, in general reduces the profit of all the firms in the market. So, will stop here today and will discuss the other type of collusive model,that is typically the price leader, same model which is low cost firm high cost firm. That is in our next session.