Lecture – 137
Nash Equilibrium

Ok to understand these a strategic interaction and to know what happens in such scenario we need to understand the concept called Nash Equilibrium.

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What we have so let us continue with the case when we had 2 firms and they are indulged in price competition, but to keep our life simple what we assume that they can decide either the high price or the low price. So, let me write it one way and then you would see how convenient it is when we represent it like this. This is called game table and let us say here we have firm 1 here we have firm 2. Here let us say the firm can price it is product high or here firm can price it products low.

And similar for firm 2, so what it mean? What this box means? That what are the profits made by firm 1 and 2 when the both of them price their product high. So, in that case let us say hypothetically they both earned 15 units ok. What happens that when a firm prices it is product high and the other firm prices it is product low, the firm whose price is low would capture the whole market, and the firm which has higher price would get nothing so 0 for the firm 1 and let us say 20 for the firm 2. You must have noticed that we are

writing here 2 numbers the first number indicates the profit made by firm 1 and the second number indicates the profit made by firm 2.

So, in this box 0 is the profit of firm 1 and 20 is the profit of firm 2 now because this problem is symmetric here what happens the firm 1 makes 20 because it is price is low and firm 2 makes 0 because it is price is high. Now if they both have the low prices they split the market and they get 10 and 10 each. Now what we need to figure out what is going to happen in this market i suggest that you pause the video for a moment and think about that what should be the decision for these 2 firms in this particular scenario ok.

So, let us try to solve it now firm 1 does not know what firm 2 is going to do. So, firm 1 can find think about you know can rationally think about what firm 2 is going to do. So, let us look at this particular way of thinking that firm 1 thinks that firm 2 is going to price it is product high, it means; firm 2 is going for ph. So, if firm 2 is going for ph what should firm 1 do because if firm 1 also goes for high then it is going to be 15. And if firm 1 should a firm 1 goes for low then the profit is going to be 20 20 is of course, greater than 15.

So, here firm 1 should go for the low price if firm 1 things that firm 2 is going for high price. So, here we will indicate this is the higher number ok. This indication is just for our convenience. Similarly, firm 1 thinks that firm 2 is going to price it is product low then what should we do if it prices it is product high then it is going to be the profit is going to be 0 which is less than this 10. So, in this case also the firm 1 should price it is product low. Now from here firm 1 can conclude that no matter what is the pricing strategy of firm 2 it is better off by pricing it is output at low price, because low always gives the higher profit.

Similarly, what we can do that firm 2 would have a very similar logic and we would see that firm 2 is also better off by having low, low in no matter what firm 1 does firm 2 would prefer to price it is product low. Now let us pay attention to this particular box, what is happening? That firm 1 is pricing it is product low and firm 2 is also pricing it is product low. Now we have to think about can firm if this is the scenario can firm 1 do better given what firm 2 is doing.

So, firm 1 can if firm 2 is playing PL then firm 1 can either be in this box or can be in this box ok. Only these 2 boxes are feasible and which box gives the higher payoff to the

firm 1, this box gives which corresponds to PL for the firm 1. So, firm 1 does not have the any incentive to change it is behavior and same is true for the firm 2. Firm 2 can if firm 1 is playing pl then firm 2 can either be in this box or this box. Again, this box is better for firm 2 and therefore, none of the firms have any incentive to change their behavior, they would not like to change their behavior given what other firm is doing.

If you notice here in this box if they both had played high then both would have been better off, but the problem is that if one is playing high then the other firm has let us say if firm 2 is playing high then firm 1 has incentive to play low and to deviate and make the higher profit. This is the only box in this game from which none of the players have any incentive to deviate. In other word what we can say what is happening these 2 firms are deciding independently, they are not talking to each other that is also a possibility what if they talk to each other, it is also possible they collude with each other and act like a monopolist that is a different then the market does not have a true oligopoly it has a monopoly.

So, we are not talking about that scenario we are talking about the scenario in which both firms act independently. And so, it means that given what other firm is doing what is best for the firm 1 to play PL and given what firm 1 is doing what is the best for firm 2 to do is to play PL. When players are playing their best response given what others are doing because a player does not have any control over what others are doing. So, this is called the best response from the players. And if each player is playing their best response given what other players are doing then we say the scenario a nash equilibrium ok. So, in this case PL comma PL is the Nash equilibrium ok.

So, this is the concept of Nash equilibrium we will take help of this particular concept to figure out what happens in case of Curnow game Bertrand game as well as in the stackelberg game.

Thank you.