An Introduction to Microeconomics
Prof. Vimal Kumar
Department of Economic Sciences
Indian Institute of Technology, Kanpur

Lecture – 139
Stackelberg Model of Duopoly

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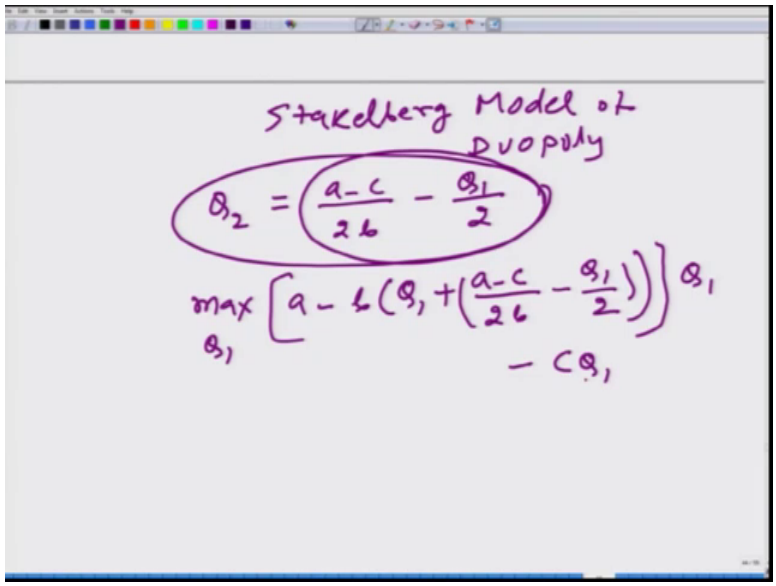

So, let us talk about Stackelberg, Stackelberg Model of Duopoly the setting is very similar to the Cournot game. The only difference is that the 2 firms do not make their quantity decision simultaneously. Here we can say that the firm 1 is a leader, what it means that; firm 1 decides first firm 2 observes what firm 1 has decided and then firm 2 makes it is production decision. So, firm 1 is the leader and firm 2 is the follower.

So, the optimization problem that we did earlier in the Cournot game this is exactly the same for the firm 2.

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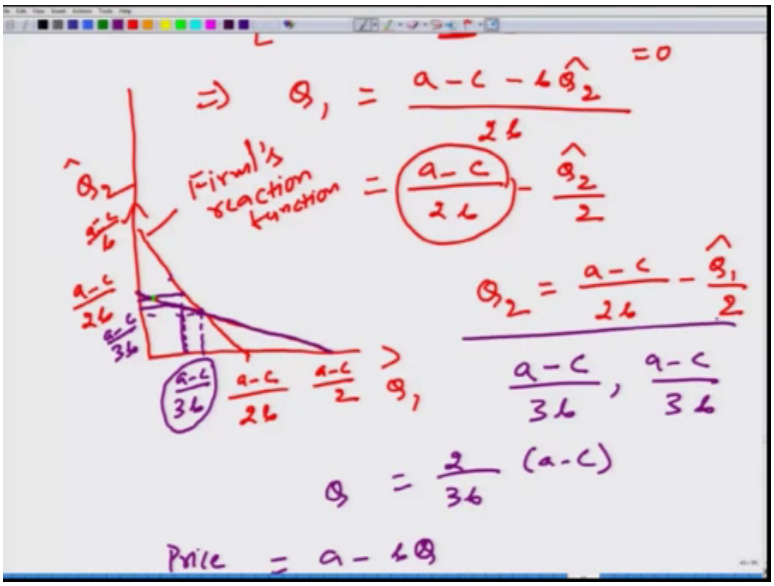

For firm 1 we will see the change. So, what we have obtained because firm 2, here what we have done? Here firm 2 in the setting Cournot setting.

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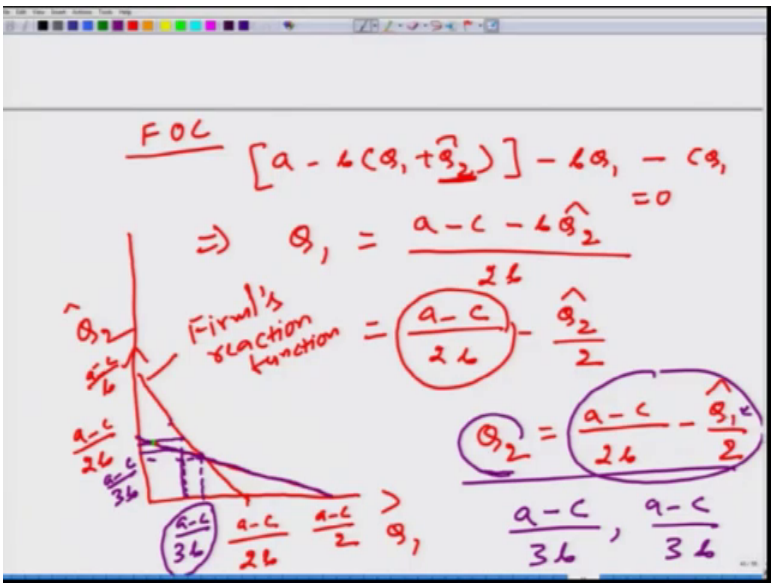

What we have done? That firm 2 things that firm 1 is going to produce Q 1 and this formula gives the optimal level of production for firm 2. The only difference here is that it is not firm 2 believe anymore firm 2 knows for certain that firm 1 is going to produce Q 1 amount because firm 2 has observed how much firm 1 has produced.

So, Q 2 is going to be a function of a minus c divided by 2 b minus let us go back Q 1 by 2. And there is no hat here because firm 1 firm 2, sorry firm 2 knows how much firm 1 has produced. Now let us think about the optimization problem or the profit maximization problem of firm 1. Firm 1 when firm 1 makes it is production decision it does not exactly know what firm 2 is going to produce, but firm 1 knows that firm 2 is profit maximize. And firm 2 is going to observe how much it has produced Q 1, and firm 2 is going to take it into account and would produce according to this formula.

This firm 1 is aware of. So, firm 1 rather than thinking that how much Q 2 would be in the market firm 1 would know that if it is equal to Q 1 Q 2 would be given by this particular equation. So, the firm 1s profit maximization problem would be maximized with respect to Q 1 a minus b Q 1 plus Q 2 and Q 2 happens to be here a minus c divided by 2 b minus Q 1 by 2 this is what and here this is the price in the market multiplied by Q 1 minus c Q 1. And this is the optimization problem in for the market leader in the Stackelberg problem.

Remember in Cournot problem here we could not do this because firm 1 didn't know what firm 2 is going to produce, but here even though firm 2 is going to move after firm 1 has decided, firm 1 knows that this is the formula firm 2 would be using how much to produce, just let me check that it is correct ok.

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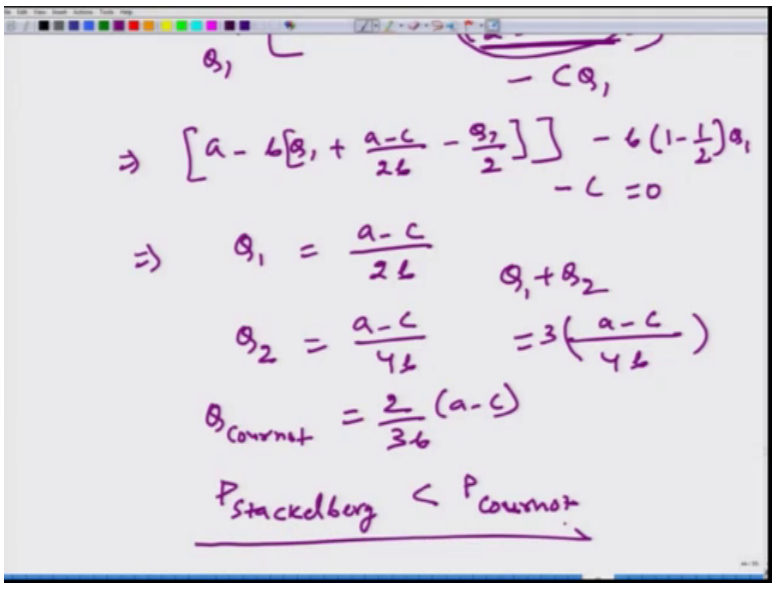

So, if we solve this problem what would be the profit maximizing condition, a minus b Q 1 plus a minus c 2 b minus Q 1 by 2 minus b 1 minus half multiplied by Q 1 minus c has to be equal to. So, when you solve it from here you will get the amount of Q 1 which will come out to be a minus c divided by 2 b.

And when you plug it in the formula what you are going to get is Q 2 is equal to a minus c divided by 4 b. So, how much is going to be Q 1 plus Q 2? It is going to be equal to 3 by 4 b multiplied by a minus c. So, what happens to the total level of production? The total level of production is more than the Cournot because we see in the Cournot let me write Q Cournot is 2 by 3 b a minus c. So, the level of production goes up from the Cournot in a Stackelberg setting. So, when the total output is more in the market the price in the Stackleberg is going to be less than price in the Cournot market. So, that is it about Stackelberg competition.

Thank you.