Lecture – 115
Supply curve

So, let us talk about supply decision of a firm operating in perfectly competitive market.

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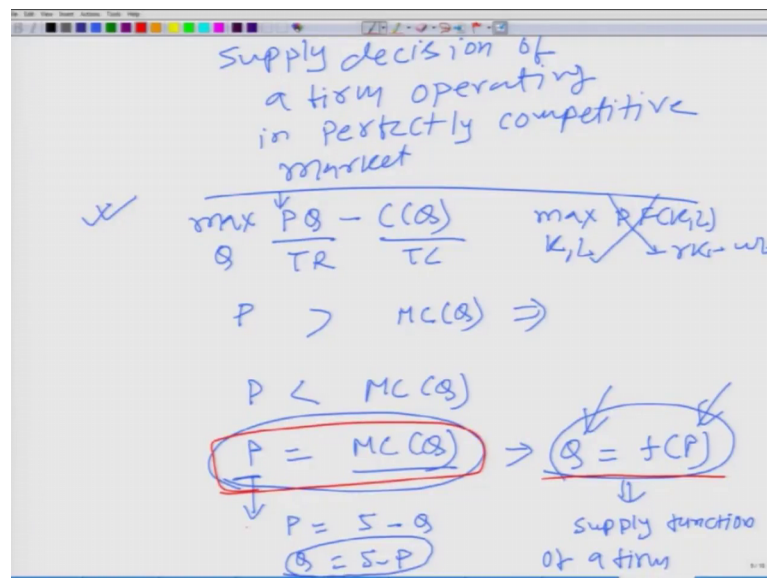
Now, we have already done the profit maximization. So, we are going to do exactly the same thing, but slightly in different manner. What a firm does is maximize its profit and we will write it like this P Q minus C Q. Remember earlier when we were writing the profit maximizing function we did it slightly differently there we did maximize P F of K comma L minus r K minus w L, right now we are not doing this we are talking about maximizing profit as max selecting Q such that P Q which is total revenue minus C Q which is total cost gets maximized.

And of course, the first order condition because the firm is operating in the perfectly competitive market this is fixed this P does not change. So, what would be the marginal revenue? If a firm sells one more unit it will get P and if firm sells one more unit it will have to manufacture that particular unit. So, how much is going to be the extra cost? That extra cost is going to be the marginal cost/

Now, it is very simple if P is greater than the marginal cost then firm should produce further if P is less than MC Q then firm should reduce its level of production. So, when firm should stop the production when P is equal to MC of Q. We can we this we have this we have seen it earlier, but what we are going to do is to recast it as a Q, Q as a function of P because what happens here this is P which is coming from the market and this is the marginal cost which it depends on the technology available to the firm and of course, here P as a function of its given P as a function of Q. So, now, what we are doing, we are rewriting this equation as Q as a function of P. In other word we can have P and marginal cost just for example, is 5 minus Q we can rewrite it as Q is equal to 5 minus P.

What we did here that we wrote Q as a function of P and this is what we are doing here theoretically that Q as a function of P. This is what supply of course, we will have some modification, but to begin with is not it the supply function. What is the supply function? The firms willingness to supply output in the market as a function of market price, this is the market price, this is the firm willingness to supply output. So, this is basically the supply function of a firm operating in the perfectly competitive market, ok.

So, but we have some disclaimer and that we should focus on next because remember we used only first order condition and the from first order condition we got Q as a function of P. Remember when we were doing the profit maximization we talked about that second order condition is also important because it is very much possible that instead of doing the profit maximization we are doing the profit minimization remember the condition mathematical condition remains the same for profit max of maximization as well as minimization, ok.

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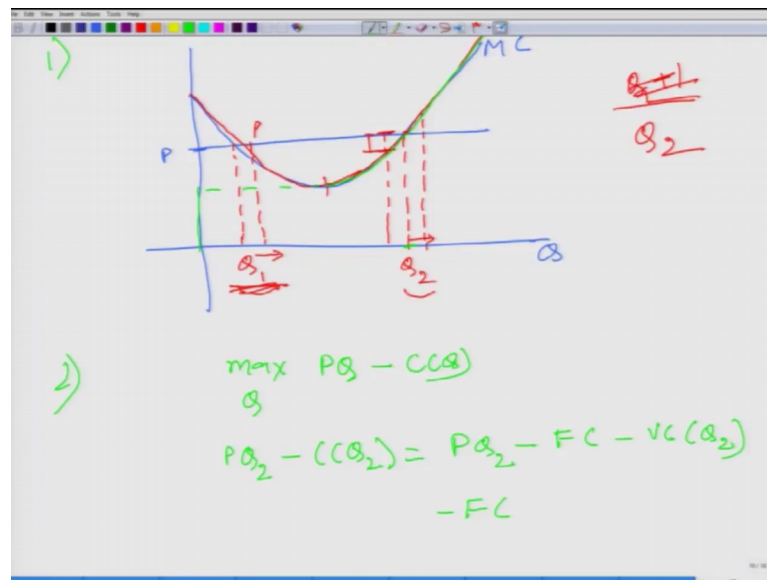
So, let us look at this condition when what when marginal cost first decreases and then increases. So, this is marginal cost here we it is as a function of Q and let us say this is the market price P. What happens? We see at two instances when Q is equal to Q 1 and Q is equal to Q 2 P is equal to marginal cost, if we pay attention to the first order condition then we it says that maximizes in happens at Q 1 and Q 2. But is it so, let us look at it at Q 1 what happens when a firm increases the production above Q 1 what happens the marginal cost goes down while P remains the same. It means a firm produces one Q 1 plus one unit instead of Q 1 unit then the profit goes up. Why? Because marginal cost happens to be less than P, so firm earns a revenue of P while the cost is less than P. So, this of course, the profit maximization does not happen here.

So, were, but how about at Q 2? And Q 2 profit maximization happen because let us see what happens if firm increases its production above Q 2. A firm increases its products and above Q 2 then the marginal cost happens to be higher than the marginal revenue. So, firm should not increase it production above Q 2. How about below Q 2? Below Q 2 P is greater than the marginal cost. So, if firm increases its production from a label which is lower than Q 2 then firms would this particular firm would increase its profit. So, therefore, the profit is maximized at Q 2, profit is maximized at Q 2.

So, in other word we can say that we should ignore the downward sloping part of the MC curve. And why MC curve is important? If you look earlier what I had said that supply

function is an inverse of marginal cost function as related to P. So, it is of course, related. So, now, we have learned that we have to ignore the downward sloping part because if we say that maximization is happening a downward sloping part that would be wrong. So, we have to concentrate on only upward sloping part.

So, we can say from here we have changed our definition slightly, earlier we said that the marginal cost curve would give us the supply function. Now, we are having this particular modification that no we have to focus on only on the upward sloping part. And why upward sloping part it is clear because downward sloping fire does not give us the profit maximization. So, that is one thing, one modification.

Let us look at the second modification there is we have to write the profit maximization function again maximize with respect to Q what we have P Q minus C Q ok. Let us say let us compare two labels it is, let us say if maximization is happening at Q 2 let us compare at Q 2 as well as the Q 2 with 0. So, what I mean to say this can be written as at Q 2 P Q 2 minus C of Q 2 which is equal to P Q 2 minus fixed cost minus variable cost at Q 2. Let us say firm decides not to produce then what would happen the total cost is going to be minus FC, ok.

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Now, if we compare these two what happens? Perform to make profit P Q 2 minus F C minus VC Q 2 has to be greater than minus F C. In other word P Q 2 should be greater than VC of Q 2 why because this will get cancelled. In other word P should be greater

than VC of Q 2 divided by Q 2 which is nothing, but average variable cost at Q 2. So, profit maximization to happen there is another condition now that P has to be greater than average variable cost, ok.

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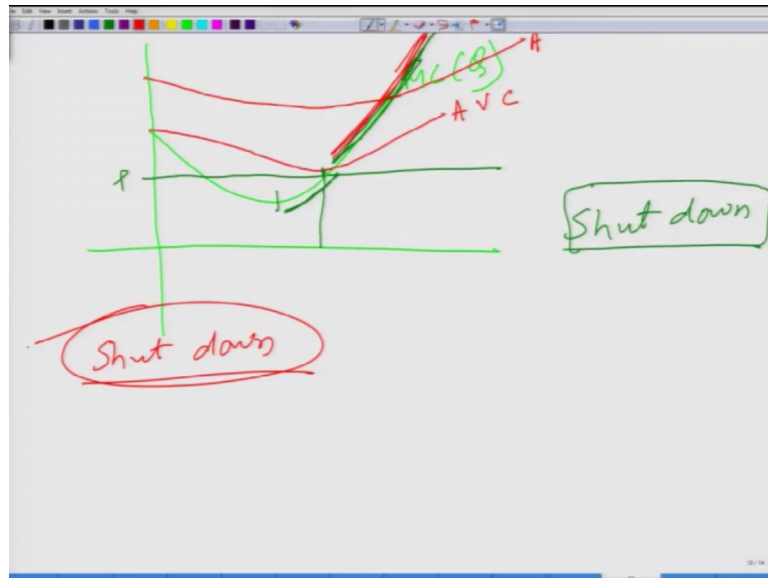
So, let us draw the graph again we have here marginal cost curve this graph you are familiar with then we have this is average variable cost and then we have this is average cost. This is the minimum point of average cost because marginal cost curve cuts the average cost curve from below at its minimum point and same is true here.

So, now earlier we started with the comment that the marginal cost curve gives us the supply function. Later we modified that only upward sloping part of the marginal cost curves gives us the supply function, and the next modification that came that the P has to be greater than average variable cost. So, this part if it so happens this part is upward sloping part, but in this zone firm would not supply, the reason is simple that in if this is for supplying this is the condition that we have here is the P. So, what happens if you know the if firm produces at this label then firm is not even able to recover the variable cost and in that case the firm would prefer to shut down ok, because firm is not even able to recover the variable cost. So, firm would not supply in this zone.

So, after second model vacation what is the case? That the supply function is given by upward sloping marginal cost function which lies above the average variable cost

function, so let me say here that only this part only this part if I use a different colour only this part gives us the supply function. So, let us focus on shut down.

Let us take an example what happens in the shutdown, let us take an example that think about a hill station and you see that off season during winter time in many hotels they sat down their operation. What happens? They already have the fixed cost for building the rent and for to keep manager, but let us see if they imply some waiter and some cleaning personnel and some cook to cater to the customer and the number is so, low or the price is so, low that the firm is not even able to recover the variable cost then firm is better off by shutting down the operation.

So, that is the reason firm would not operate in that particular zone.

Thank you.