

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

Lecture - 93
Cost Minimization

We have already talked about minimizing the cost.

(Refer Slide Time: 00:10)

$rK + wL$
↓
rental price of capital

min $rK + wL$
 K, L
s.t. $F(K, L) = Q_0$

So, the mathematical problem can be minimize.

Student: rK plus.

rK plus wL minimized with respect to what?

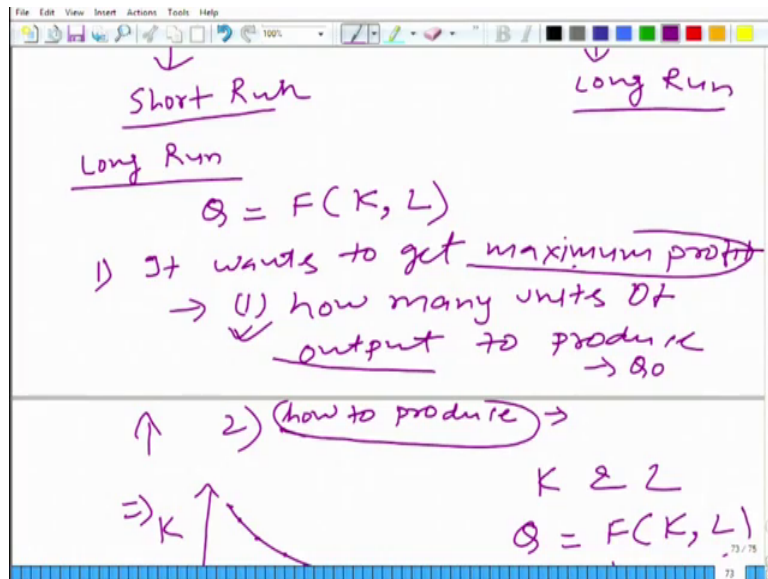
Student: Output.

Not with respect to output, output is already fixed; what I said come back to this.

Student: State of input.

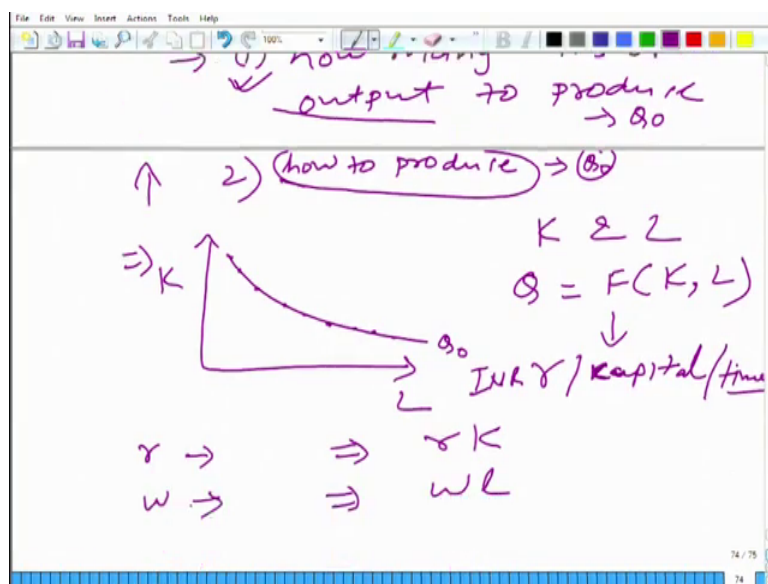
We said that these are the three things.

(Refer Slide Time: 00:34)



Maximize profit, how many units of output to produce, we have already decided here right now, that Q_0 units of output to produce what we are interested in?

(Refer Slide Time: 00:46)



How to produce this Q_0 ? And there are several ways to produce this Q_0 . So, this is given this is given what we have is F of K comma L should be equal to Q_0 we have to produce.

What we need to do here is how can we minimize this? We have to minimize it with respect to K and L by changing K and L , we can change the cost of production, but we

cannot change K and L arbitrarily if we change K L and arbitrarily we would not be able to produce Q naught.

Student: Q naught will be move we will move out from isoquant.

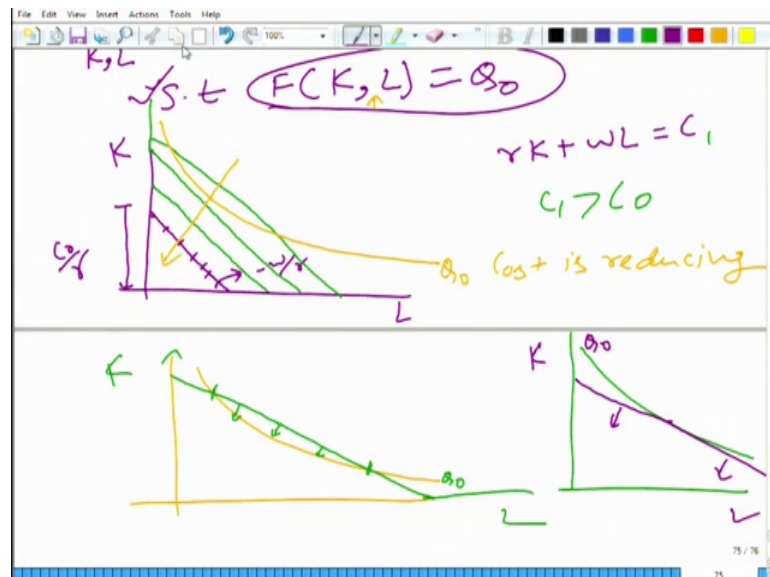
We will move out from the isoquant either we will produce more or we will produce less maybe the same, but the chances are very little. So, what we have is the idea here is that produce at least Q naught. Let us say if this is possible to produce Q naught more than Q naught and it minimizes your cost, then you are fine you do not have any problem what you are interested in is that, at least you should have Q naught of output and you should and you should be able to the associated cost, but we will not use this, we will talk about these considerations later right. Now we will take it that we are here, that we need to produce exactly Q naught such that $r k$ plus $w L$ is;

Student: Minimized.

Minimized; how can we do that forget maths we will do it first graphically, look at it here, what is $r k$ plus $w L$?

Student: It is a line.

(Refer Slide Time: 02:30)



Line straight line here what we have is capital and here what we have is labour ok. So, what we can do? We can let us say is equal to C naught, we take any where C naught is any constant.

Student: Constant.

What would we get?

Student: A line.

We will get a line and what is going to be the slope of this?

Student: Minus w by r .

Student: Minus w by r

The slope is going to be minus w by r and how much is this?

Student: C naught upon r . C naught upon r , fine and if you use any combination of capital and labour from this line the cost is going to be.

Student: C naught.

C naught instead of taking C naught, what we can do? We can take c one where c one is greater than C naught we will get another line that is parallel to the previous line and what are these can I call this line as an iso-cost line the cost is same ok. So, what we can do is, we can generate iso-cost map and on the same graph we can draw because this will give us isoquant this gives us isoquant. So, we can draw isoquant here also and let us say this is the isoquant.

Now, the idea is very clear. If you look at the isocost map if you move in this direction what is happening?

Student: Cost is reducing.

Cost is decreasing or reducing and what is our aim? Our aim is to produce at least Q naught amount some same logic. Let us say this is the isoquant and this is the isocost of course, these two lines are not parallel, but does not matter this is different here we cannot have cost minimization at this point why?

Student: Because we can move another isoquant.

Because we can move we can move in this direction and still able to produce Q naught at the lower.

Student: Cost.

Cost, so, what we will do? We will keep on moving in this direction such that, that one of the iso cost line becomes tangent to the this particular isoquant and it is isoquant here. Now it is no longer possible to reduce the cost why if we move in this direction what will happen? Cost will reduce, but we would not be able to produce Q naught amount of output we would not be able to produce Q naught amount of output. So, this condition that we have will be violated ok. So, we are solving some other problem not the not the problem that we have discussed.