An Introduction to Microeconomics
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Lecture - 81
Production in Long Run

Now, let us what we have done we have been talking about production function in short run or production function in one variable. Let us make it little bit more complicated and more realistic in that manner that.

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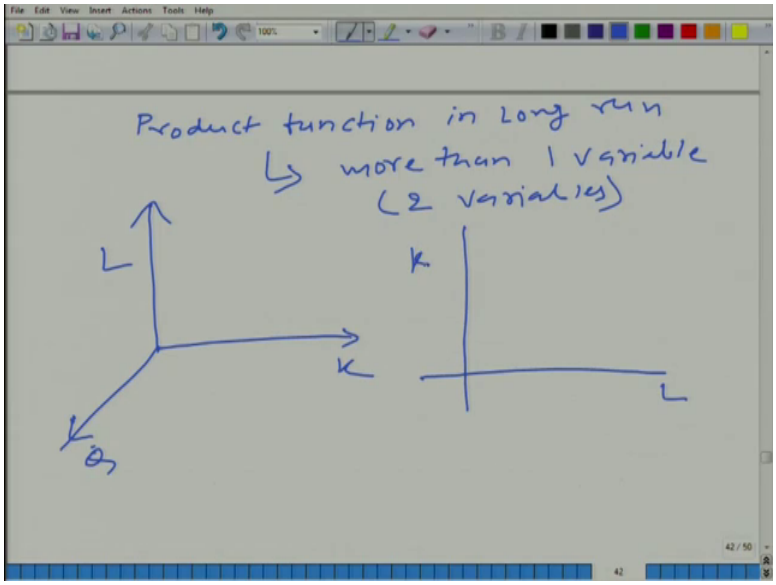

Now, we have you can say in context of in this particular problem that production function in long run or another way to put is that production function is end more than 1.

Student: (Refer Time: 00:52).

Variable and in our particular case that we are talking about we have two variables fine. And we have already talked about it earlier then what we will have here is K L and on z axis we will have Q and it would be quite complicated even doable, but complex to represent it visually in 3 dimensional graph. So, what do we do we use isoquants ok.

We use isoquants to represent this production function.

Student: Function.

And what we have here is L and K and we get rid of this particular axis ok; we basically get rid of this particular axis and what do we do? We draw level curves.

For different level we what we try to figure out the combination of K and kel L which would efficiently produce that particular label of output and that is we get isoquants.

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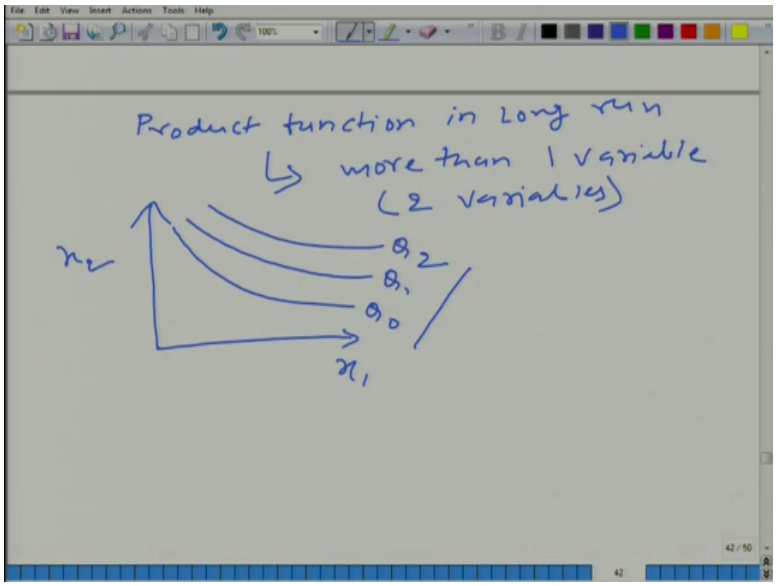

These are isoquants let say it is Q naught, it is Q 1, it is Q 2 level although notice that these look very similar to indifference.

Student: Curves.

Curves or this graph looks a I can change here instead of K and L; I say we have two consumption goods x 1 and x 2 course it looks like indifference.

Student: (Refer Time: 02:35).

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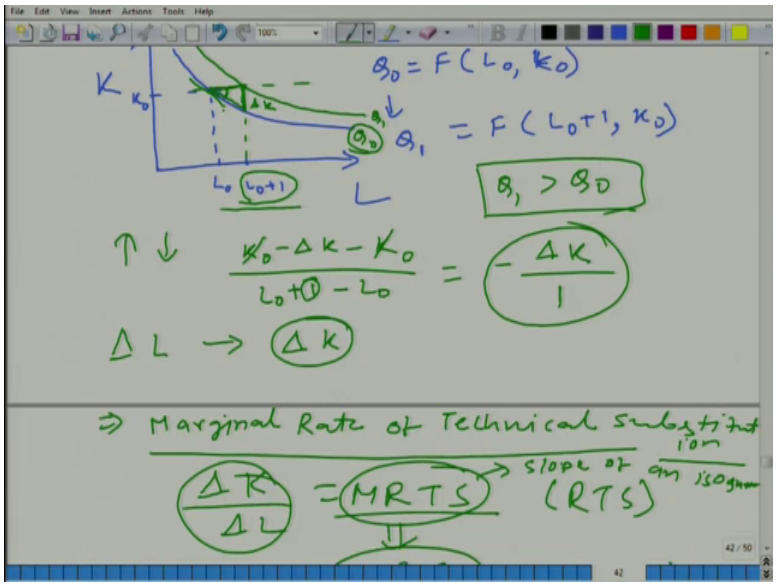

Map or a set of in difference curve, but of course, now we are talking or production; So, these trick to K and L.

Fine now let us say.

Student: So, it should be L.

No, it should be L of course, so, be L fine now let say if we increase the amount of L we increase the amount of L while keeping K fixed let say here we have L.

Student: Sir doubt the (Refer Time: 03:18) of LK curve or KL curve?

LK all every were we have been drawing LK curve.

Student: That is L is 1 x axis.

L is on x axis typically again nothing is you know sacrosanct about it, you can put K on x axis and L on y axis, but this is the convensent typically we use, but like it is not as sacrosanct as what we have in the demand curve; in demand curve we will always have?

Student: Price in y axis.

Price on y axis and quantity.

Student: (Refer Time: 03:47) x axis.

On x axis here this is also convention, but that is not we are not that particular about it nothing would change if we change the axis fine ok. So, what will happen here? Let us say if we increase the labour from L naught to L naught plus 1 what will happen?

Student: Of course.

And we keep the K fixed at K naught. So, here what we are doing earlier we had Q naught amount of output with L naught and K naught amount of cap labour and capital respectively. Now what we are having we are increasing L to L naught plus 1 and K naught what will happen to Q naught? Q naught will increase.

Student: Increase.

Let say that is Q 1 fine; So, of course, what we will have basically is if we. So, this combination of K naught and L naught 1 will give a different level of output.

Student: Output.

So, that let say we have drawn like this fine now here this is Q naught and this is Q 1; Q Q 1 is of course, more than Q naught why? Because we are assuming that marginal product of labour at this label is greater than?

Student: (Refer Time: 05:22).

Greater than 0.

Student: 0.

Greater than 0 that is why it will go up eventually remember in the table that we have had talk talked about that marginal product of labour falls below 0.

But we are not talking about that case ok. So, we move from here to here fine to bring back you know with this increased lab amount of labour and we want to produce the same amount output as earlier what do we need to do? We need to reduce the amount of?

Student: Capital.

Capital we need to reduce the amount of capital and we will bring by thus we will buy if we reduce the amount of capital in this particular manner; we will come back to this Q naught isoquant.

Is it clear ok. So, what we are talking about basically is that there is a tradeoff between these two inputs of production ok. If we increase the amount of one then by decreasing the amount of other in one particular you know by particular amount we will come back to the same production level.

And something similar we had talked about earlier using this we had talked about the slope of isoquant.

Here we are not talking about exactly the slope of isoquant, but let say here what we do let say this is delta K. So, delta K what is happening basically that K naught minus delta K minus K divided by we are taking this particular length and here we have L naught plus 1 minus L naught we get this particular slope.

Student: 0 1.

This is the slope the slope of this nine we obtain.

Student: Sir this is 0.

How come it 0?

Student: (Refer Time: 07:29) K naught plus.

This is minus K divided by 1.

Student: [FL].

This is what we get.

Student: That should be K naught (Refer Time: 07:38).

This is K naught.

Yeah fine? And what is this?

Student: MRTS.

MRTS we have not talked about it, but this helps us define a new int an a new term here and that is marginal rate of?

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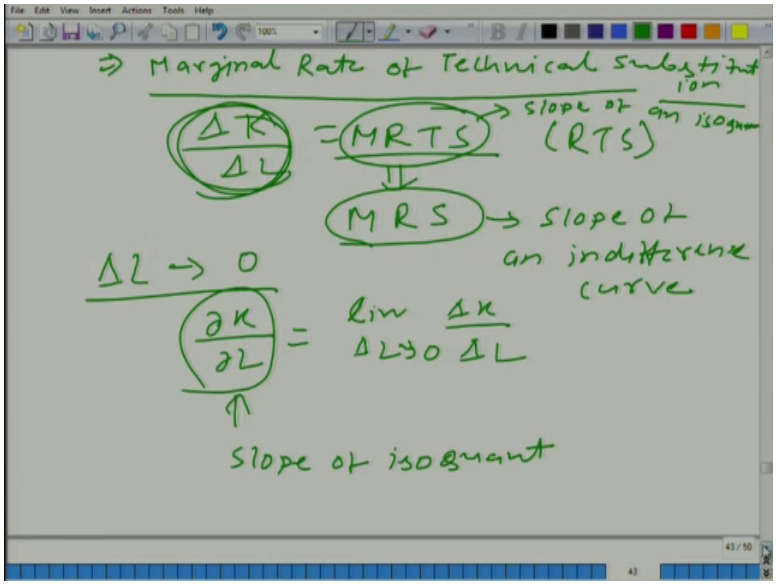

Student: (Refer Time: 07:58).

Technical substitution and what is this? Look at it here look at this here what did we do? We have substituted 1 unit of labour for some amount of capital ; we have substituted some amount of capital that is delta K amount of capital by 1 unit of labour this is basically defined an marginal rate of technical substitution. So, in more general case here we are of course, taking change in labour is 1 instead of talking about change is labour an 1, we can talk about delta L change in labour.

And delta L if we increase the labour by delta L; let us say the capital needs to be decreased by delta K amount to bring the output at the same label in that case delta K divided by delta L will be defined as marginal rate of?

Student: Technical.

Technical substitution in short MRTS this is also called rate of technical substitution, you can get rid of this marginal term; it represents the same thing ok. You can either say MRTS or RTS fine; remember this is very similar to marginal rate of substitution.

Student: Substitution.

That we have learned in the consumer theory and what is marginal rate of substitution slope of?

Student: In difference curves.

Slope of an indifferent curve and what is MRTS basically?

Student: Slope of (Refer Time: 09:58).

MRTS is basically the slope of?

Student: Isoquant; isoquant.

Of an isoquant, but in this form this is not the slope of isoquant, when do we get the slope of isoquant? When we take delta L.

Student: 10 to 0.

To 0 then instead of getting secant this is the secant here; we get tangent at this particular point. And then we say then we can say delta K by delta L that is nothing , but taking the limit of this in this expression limit delta L going to 0 and this is the slope of the.

Student: Isoquant.

Isoquant basically this is the slope of isoquant and what does it give? What is the economic interpretation that it gives the tradeoff between two factors of production. So, that we remain on the?

Student: (Refer Time: 11:02).

Same isoquant here of course, we have only two factors of production what will you do if you have more than two factors of productions. So, what you will do you will keep all other factors fixed and you will change only two factors of production.

In trade off rate that you are interested in and then you will get the marginal rate of technical substitution with respect of one input for the other input that these two inputs you have varied fine; is it clear ok? And this is very very important as we have learned in the earlier chapter that how important MRS is; what does MRS give just for just to you know the tradeoff that in your mind that you are willing to accept and at the optimal label

that trade off should be equal to the market trade off market allowed trade off. Here again we will talk about remember we are talking about producers and what they are interested in? They are interested in making profit.

So, of course, they are interested in producing something and he here we have two factors of production. So, later on we will learn that the particular combination let say they want to produce Q naught amount of output; they can take any combination this combination, this combination, the infinite combination according to this isoquant are possible. So, which one they will choose of course, it would depend on the prices of these two factors.

Student: (Refer Time: 12:42).

And there you will see that MRTS place the very similar role that MRSS pay played in the consumer theory, but that is for later we will come back to it later.