An Introduction to Microeconomics
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Lecture - 98
Cost in Short Run: TC, FC and VC

What we are going to do now? For time being, we are going to move from long run to short run cost curves in short run and how short run is different from long run.

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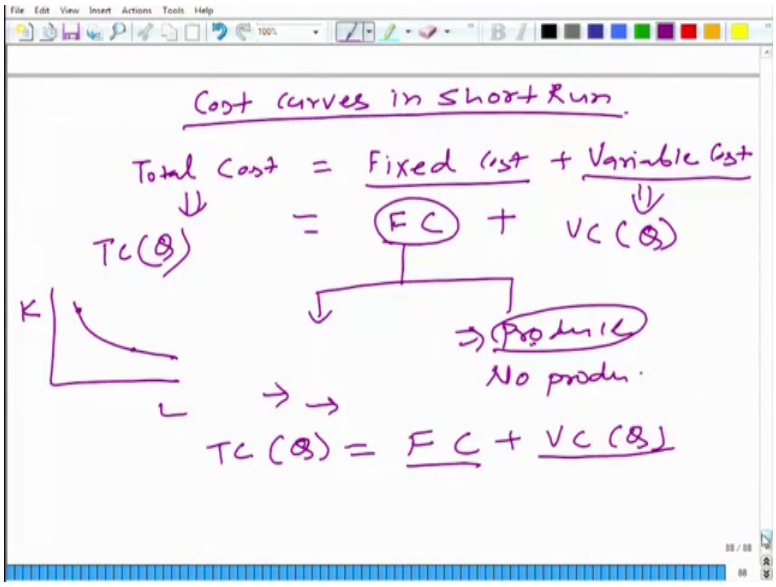

Student: Sir at least one of the variable does not change.

One of the inputs.

Student: Input vary input.

One of the inputs cannot be varied and so far we have been talking about that capital is that input which we cannot vary in the short run, but just keep in mind it can be any input.

Student: Varied.

So, what we can again we can start with the total cost, remember, this total cost; it can be divided into 2 components; one is fixed cost and second is variable cost. What we have

learned in the long run the total cost is a function of Q ok, anyway, if you look at this graph what we have here is p and L, even if we use different combination it will depend total cost will depend on the K amount of capital used amount of labour used and of course, amount of capital and labour would also determine the quantity produced, so total cost is a function of Q. How about the fixed cost?

Student: Sir, it would be;

By name, it should be clear that the fixed cost is the component of cost that does not vary with the output.

Student: Output capital.

So, let us denote it by FC ok, in our case, we can say that if capital is fixed at 5 then fixed cost is the cost of having these 5 units of capital. But even further I am not purging it that much, but you can think of that fixed cost can be of 2 type ok, one is one you can you can say one component is I do not know what name to give just, just think about it that one component of fixed cost is that you incur it even if you do not produce anything ok.

Like for example, you have decided to start a firm to produce let us say pen and you have already hired rented a building you have already hired some machinery ok, you are not producing anything you are not operating anything because you have not yet hired the workers. But still you have to pay for the rent of that building and the rent for that capital ok. So, even if you are not producing anything you are incurring that cost, so that is one kind of fixed cost.

Second fixed cost can be that it depends on only your decision to produce and no production if you do not product produce anything you do not incur any cost, but if you decide to produce even one unit then you incur that cost. But why I am keeping it in the fixed trust because that cost would not change with the level of production. For an example let us say that government has this regulation that, if you produce you will have to get your come your output audited or your cost audited.

So, it does not matter whether you put it and cost of audit is let us say independent of your output, it is about if you hire an auditor you have to pay does not matter whether

you produce 5 units or 10 units. So, that is a different if you do not produce anything you do not have to that auditor. So, that cannot be a cost to you.

But if you even if you produce just 1 unit you will have to hire that auditor. So, it is a different kind of fixed cost, but for theoretical purpose, so we would not distinguish between these 2 different kind of fixed cost. Even the example that I gave you of the building we can say that again if we have a building and building can accommodate let us say production up 2000 units, but if you go from 1000, 1001, you will have to rent another building. So, now it becomes here dependent on the output, but here we will keep it if as long as we are producing in this zone 0 to 1000 of course, for this particular example and for theoretically as long as we are in the zone we will keep the cost for that building in the fixed cost is it clear and what is variable cost.

Student: Sir the cost of labour.

In our example the cost of labour because cost of labour we can change, cost of cost of labour would change with the labour that we would change with different level of production. So, in other word variable cost is the component of total cost that varies with the output. So, I can say VC is a function of Q, so total cost that we have here is again a function of Q which has 2 component, a component that depends on Q and the second component that is independent of Q. So, we can we can try to draw it here this is very simple.

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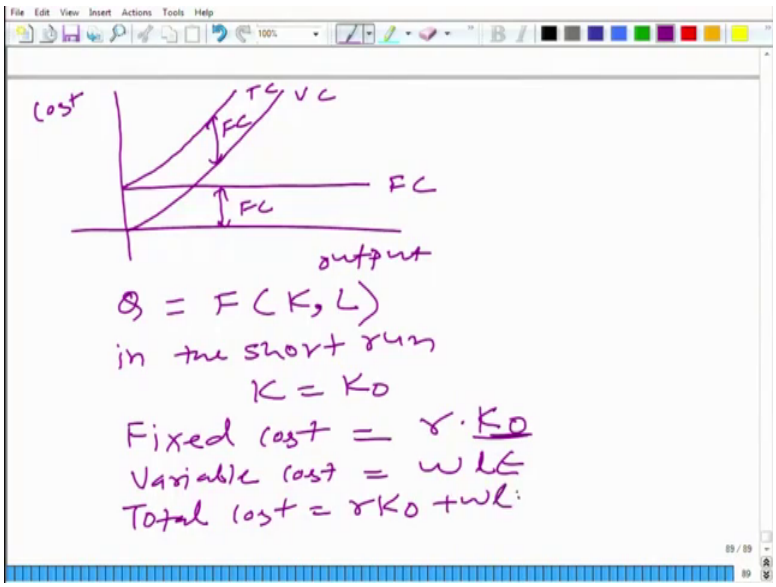

let us say, here we have cost here we have output and this is fixed cost by definition, it is not it does not change with the output fine and here, we have let us say variable cost; typically variable cost would start at variable costs will start at the origin because, it varies with the output no output no variable cost and by adding these 2 what we can get is total cost. So, from variable cost how can we get total cost it is just parallel shift and how much is the sift equal to.

Student: The fixed cost.

The fixed cost this is the amount of fixed cost here it gets added, fine.

Student: Yes sir.

So, just let me just write it here what we have done so far is that, we have taken Q is a function of K and L and we have said in the short run K is equal to K naught. So, what vary fixed cost we have r multiplied by K naught this is the fixed cost and how much is the variable cost.

Student: W l.

W l because remember this is fixed this is not fixed, so what we get is total cost as fine.

Student: Yes sir.

What we can do we have earlier defined the average cost that is basically average total cost, we can define also average using the concept of average; what we can define is average fixed cost and average variable cost.

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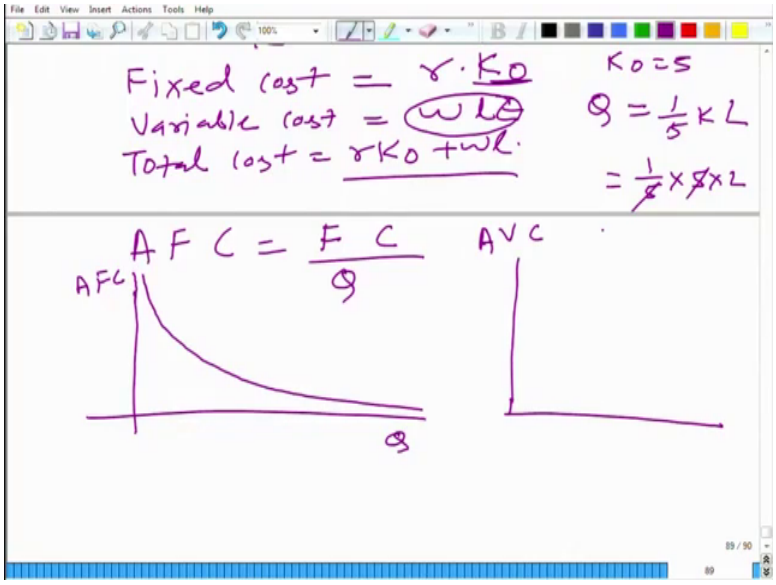

In short average fixed cost is AFC and it is nothing, but fixed cost divided by total quantity can you draw this; how would it look like.

Student: Sir, it would shrink to low level.

So, starting from really infinity because, when you have almost 0; like let us move in the direction of 0 direction towards 0, then what do we get really very very high fixed cost on average and we keep on producing more and more the fixed cost gets distributed over large amount of output. So, average fixed cost starts decreasing as the output increases and eventually, it becomes equal to 0 ok.

Average fixed cost and here output more technical would be to say that asymptotically it becomes equal to 0 because in reality it never is never is equal to 0 and how about average variable cost. We cannot say with certainty, how would it look like, but let us say this particular case that we have taken and Q is equal to let say K 0 is equal to 5 and Q is equal to 1 by 5 KL. So, in the short run what we are getting 1 by 5 multiplied by 5 multiplied by L, so Q is equal to L. So, in that case variable cost is simply variable cost and Q output is simply a line passing through origin.

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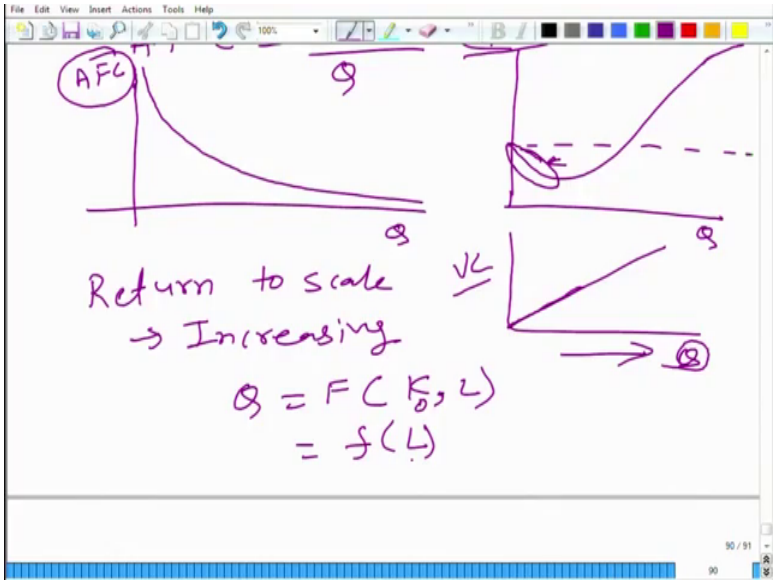

So, in this case of variable cost is going to be fixed. So, this is what I want to emphasize that do not get confused average fixed cost is decreasing with output, while average variable cost is fixed with the output and this is common mistake that people make.

Student: But this is for only the given case.

Even for the given case, but what we can have what I am saying there is a possibility that average variable cost is fixed, we may get let me use a different color we may have something like this or more appropriately if you think about it remember when we were talking about production function, what did we say that output increases in the beginning at the fast rate. So, in that case if it decreases at the fast rate it means average variable cost is decreasing and then rate of increase become.

Student: More.

It starts decreasing of outputs the rate of increase in output starts decreasing and eventually, it becomes flatter and flatter.

Student: In.

So, it so here we are getting the opposite result and that we will see immediately.

Student: So, sir in this graph if L is varying we got the final Q as L, if you shift it

Just liquid is this so this is the case.

Student: sir, but if L is varying then this won't be a straight line.

Would not be a straight line, it would be something different that is what I am saying, so 1 case would be that it would be something like this.

Student: Ok sir.

And there is a reason that I am picking this one, remember when we were talking about.

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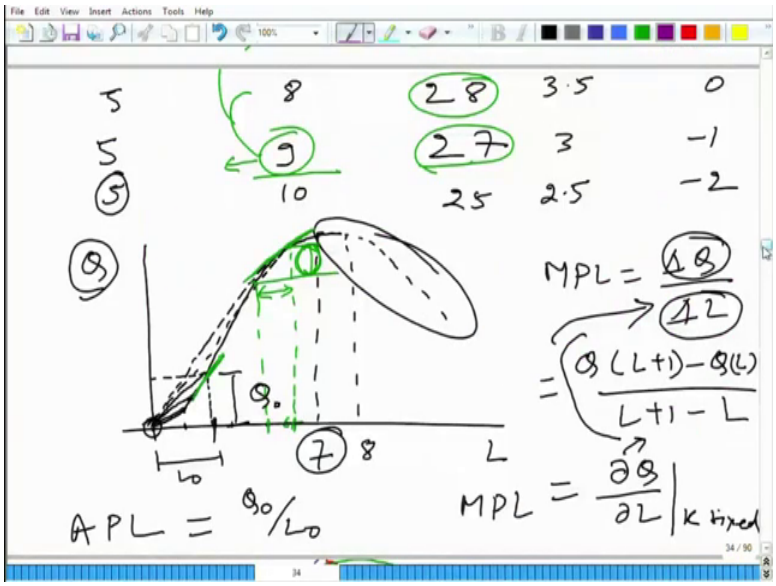

Student: Sir, but if labour is fixed; how will it be a variable cost, it will not come into the category.

Labour is not fixed.

Student: Sir, like you the conversion is you did just before the graph.

What we have learned here in this graph just look at this graph again, what is happening rate of increase in again we do not have the same production function as Q is equal to L; it is a different production function the functional form is not given what is happening here, L is increasing Q is increasing here rate of increase is increasing with L, but eventually rate of increase in Q starts decreasing.

Student: Decreasing.

So, what we can we have learned it means what is happening here what we have learned just in the context of return to scale, in this zone what we are getting is basically increasing return to a scale and in this zone we are getting decreasing return to scale.

Student: Decreasing.

Now coming back to your question here;

Student: Sir, the calculation you have done at the top right if you shift the screen a little lower, yes sir.

Yes.

Student: Sir like you did K naught equals to 5, so Q equals to half 1 by 5 into K into L it is it Q so Q is equal to L.

Ah

Student: And then you took that L is fixed so it is a straight line.

L is not fixed because remember here what we have here is it is Q and here we have variable cost if we move in this direction Q is increasing. So, Q is increasing what does it mean that L has to increase that is why cost is linearly increasing.

Student: Ok in that way yeah that term.

So, this is a straight line passing through origin.

Student: Origin.

Now, what we have here we are talking about average variable cost ok. So, average variable cost is one way to say is that you get a point from on origin and get a point on the variable cost and you draw a line again you will get the same line slope is going to be same everywhere. So, that is why you get a straight line, but remember why it is decreasing here because, in the beginning typically we have already discussed that in the beginning we get some kind of increasing return to scale and later on we get.

Student: Increasing return to scale.

Decreasing return to constant return increasing first then constant and then decreasing return to scale. So, that is what is reflected here ok.

Student: So, but here it is decreasing first.

So, the return to notice this we are talking about return to scale that is increasing that is what I am saying there is inverse relation between the cost function and return to scale if it is increasing return to scale average cost will be decreasing.

Student: Yes sir, according it will fix.

So, that is why I am saying here in this zone what we are assuming that we get increasing return to scale even in the short run, but you can very well say; how can you talk about increasing return to skill when you are not varying the capital ok. So, what I mean to say is that rather than taking Q is equal to f of K naught comma L as the production function we take Q is equal to f of L as the production function you understand, fine.