Applied Econometrics
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Lecture – 86
Model Specification - Continued

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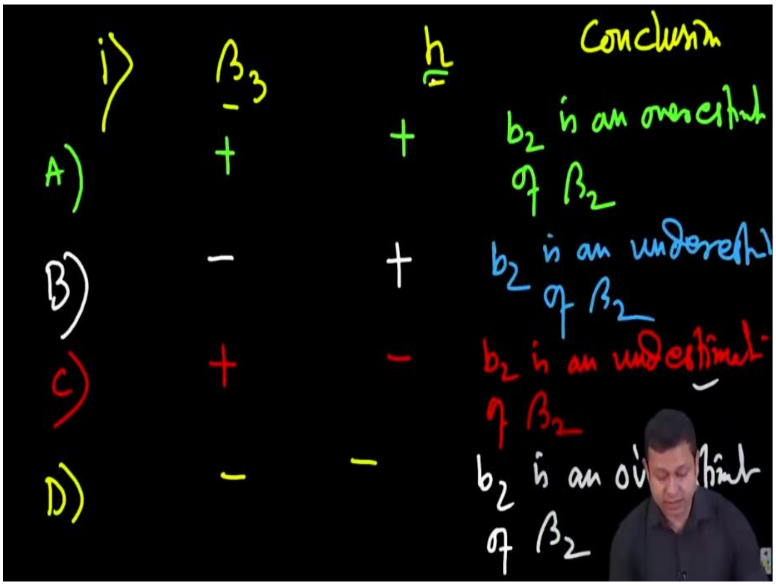

Hello and welcome back to the lecture on applied econometrics. We have been talking about model specification, within that we have been talking about omitted variable bias. And in the previous lecture, we spoke about the magnitude and direction of the bias and it is going to be a continuation of that. Now, let us say there is a case.

We have been seeing this that there is this beta 3 and h and the way we look at the the relationship and how do I estimate the magnitude and direction of the bias. Now, let us say that there is no correlation between beta 3, so X 2 and X 3, so essentially if there is no correlation between X 2 and X 3, so that is let us our case 5. We had this four cases here and I am just adding to it another case.

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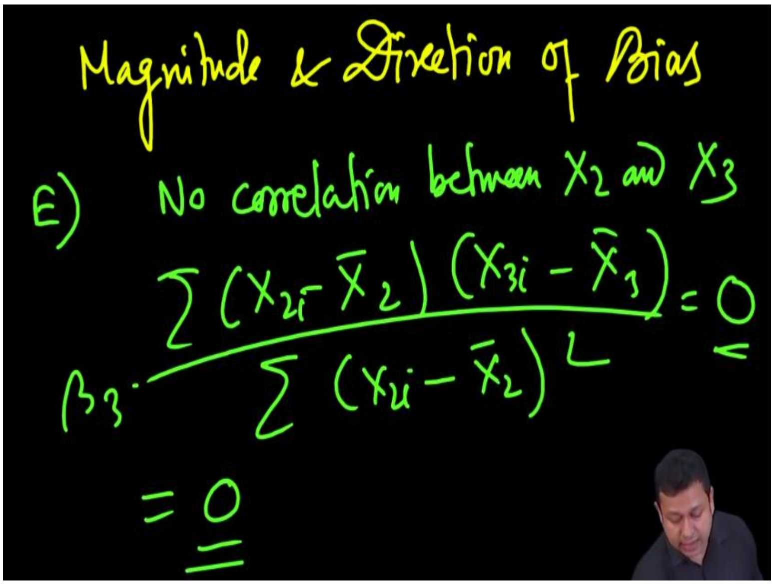

Case 5, no correlation between X 2 and X 3. So if that is the case, so what I will have is that this X 2i X 2 bar and X 3i – X 3 bar that we have estimated that is going to be, the numerator is actually going to be 0 that is this is going to be 0. So, if this is 0, essentially if I multiply beta 3 with this, this is going to be 0. So, essentially that the quantum of bias, the essentially the bias term is going to be 0. So, if there is no correlation between X 2 and X 3, though there is no bias, we do not have any bias.

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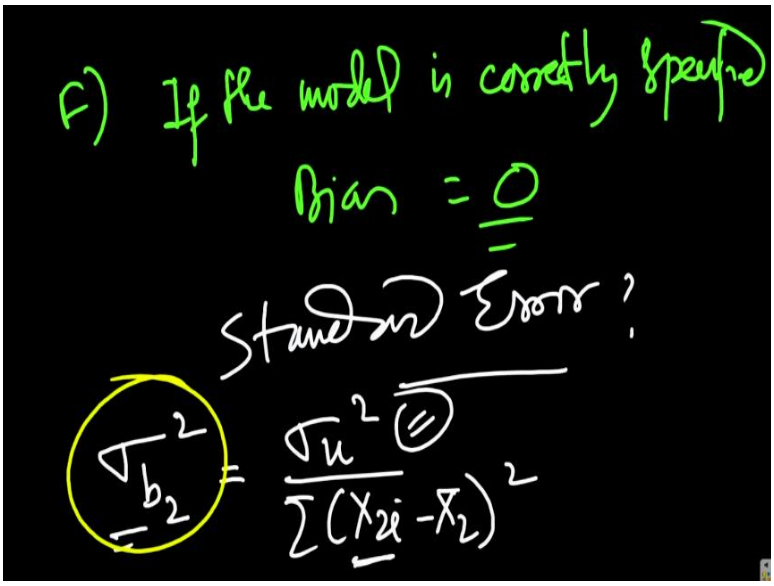

The last case, if the model is correctly specified, so then there is no question of any any bias because the model is already correctly specified. So, again, the bias term is going to be 0. So these are some additional cases from what you have seen from the previous lecture. Now, already we understood the bias, but what is happening to the standard error? Now, remember how we estimated standard error.

We have seen previously when we are talking about the multiple regression. So essentially, the standard error for this estimator b 2 is going to be we get the sigma u for the error term and then the X 2i X 2 bar square. So, the moment I have my this term bigger, then this term is also going to get bigger. So, let us see that.

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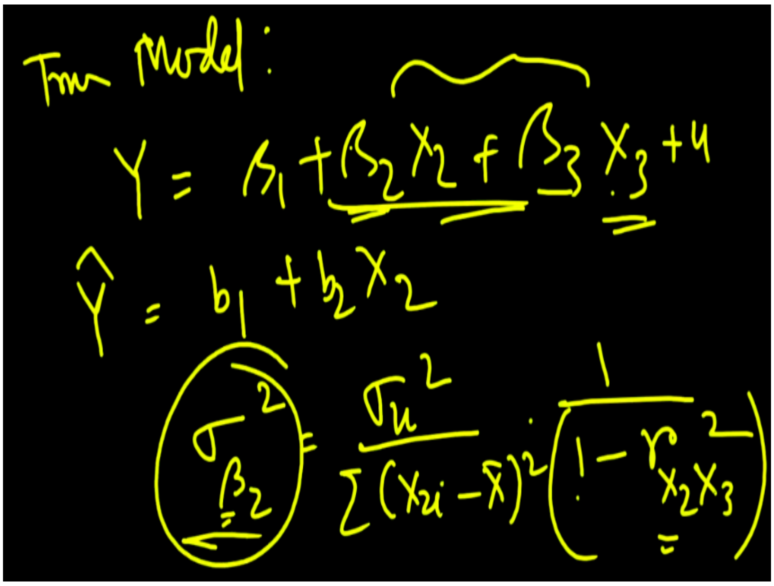

Actually, now in this case when I have my model specified just in terms of X 2 and I exclude the variable X 3, then the true standard error, let us see if my model has just like before true model Y = beta 1 + beta 2 X 2 + beta 3 X 3 and u and estimated model is b 1 + b 2 X 2. Now, I have excluded this. Now, what is in for my true model, when we talked about multicollinearity, we have seen that in true model the error, the standard error corresponding to b 2.

Because of the presence of this beta 3 X 3, the standard error for beta 2 is going to be sigma beta 2, now I will write the true model beta 2 = sigma u square by X 2i – X 2 bar whole square into 1 – r, r is the correlation coefficient between X 2 and X 3 and that squared. Now, this term this r is always less than 1, so r square is going to be less than 1, so that is going to be 1 minus something less.

So that is this whole term is going to be less than 1. So actually, the standard error should have been much higher. So what I am estimating here this standard error it is actually lower than this standard error, right. And because of this, when I estimate my t statistic, which is essentially for my when I am testing the significance of my model or the importance of variable in the model, so because of a wrong standard error I am actually going to get a T stat which is wrong.

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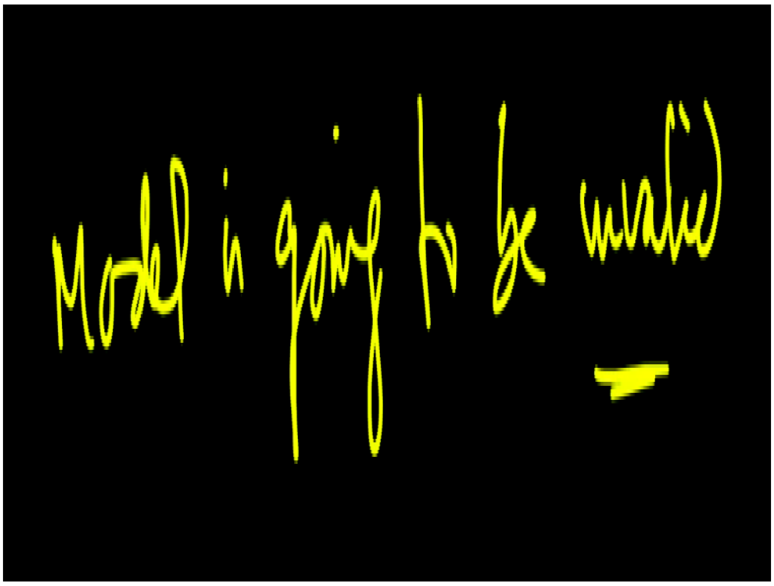

And that is why because my standard error is wrong, my model is going to be invalid. My model is going to be invalid because my standard error is wrong. So, this is the consequence of having omitted variable bias so far as standard error is concerned. Now in the next lecture, we are actually going to talk about what is the impact of having an omitted variable to the r square that we actually estimate and we will see depending on the overestimation or underestimation, how the r square also changes. With this, we end this lecture here. Thank you.