Applied Econometrics
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Lecture – 89
Model Specification - Continued

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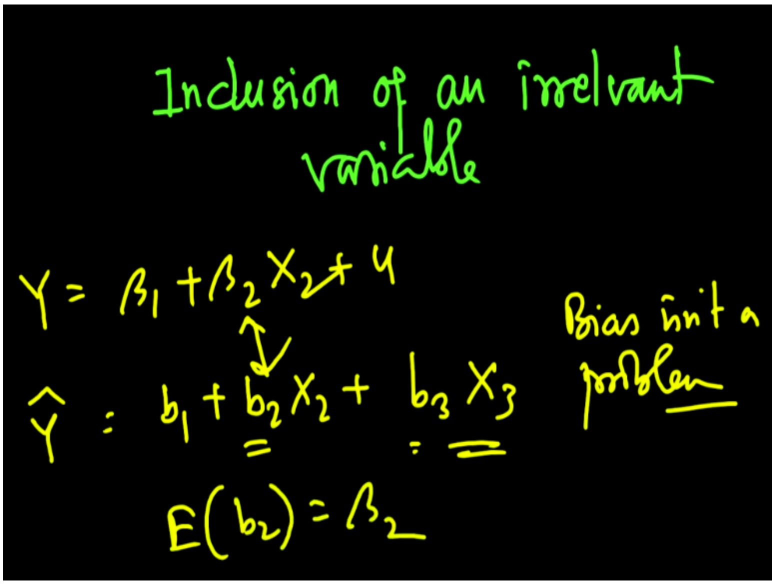

Hello, and welcome back to the lecture on applied econometrics. We have been talking about omitted variable bias. Essentially, we were addressing the model specification problem and omitted variable bias is one type of model specification problem where we actually omit a relevant variable. The other type of problem of model specification that we spoke about is the inclusion of an irrelevant variable.

So if we have a variable that has nothing to do with the Y variable, but still we include that in our model. So let us say I write you remember that that equation where my true model Y = beta 1 + beta 2 two X 2 into u, whereas your estimated model is b 1 + b 2 X 2 and b 3 X 3. So, you have basically included something that was not relevant to the model. Now, in this case what will happen?

So, if we actually see that it is actually not going to create any bias in the b 2 terrm. So, b 2 is actually not going to be biased because if we take an expectation and if we can actually we can prove it that this presence is actually not going to create any bias. So, b 2 is going to be a true estimation for beta 2, so that is not the problem. We are not going to do the proof here, but we can say that that bias is not a problem here.

But where the problem is going to come is in terms of the efficiency, the standard error. So, here expectation of b 2 is going to be equal to beta 2. The problem is in terms of the standard error.

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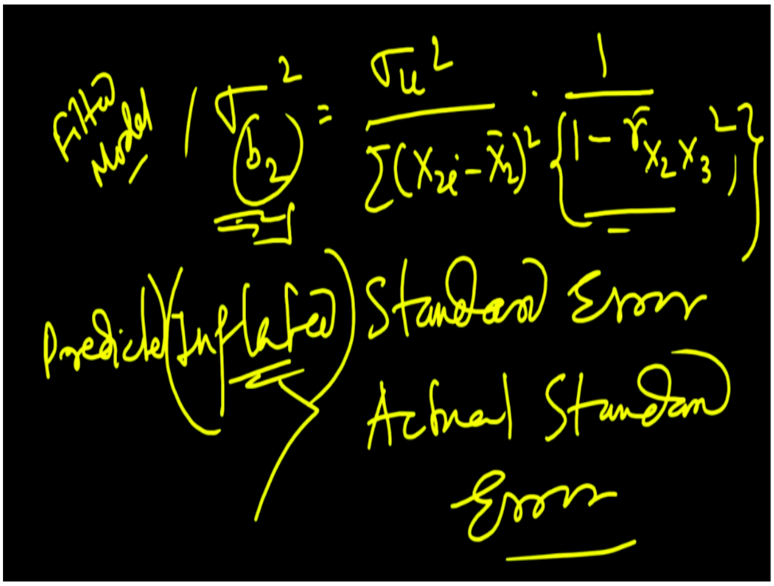

So what will happen here because just like the previous case, my standard error of b 2 is actually in this new model in this estimated model here for this fitted model, this is a true model. So, for fitted model this is going to be u X 2i X 2 bar squared and in this model, you note that we already have this b 3. So what I will have by definition r X 2 X 3 square. So in my fitting model, the standard error for the beta 2 estimator is going to be this.

So now, this term is less than 1, and this whole denominator is going to be less than 1. So the value that I get for this standard error is going to be more than the actual standard error. So we are going to get an inflated standard error, which is bigger than actual or this is basically predicted, the predicted standard error let us say, this is actual inflation, this is going to be bigger than actual standard error. So what is going to happen because of that?

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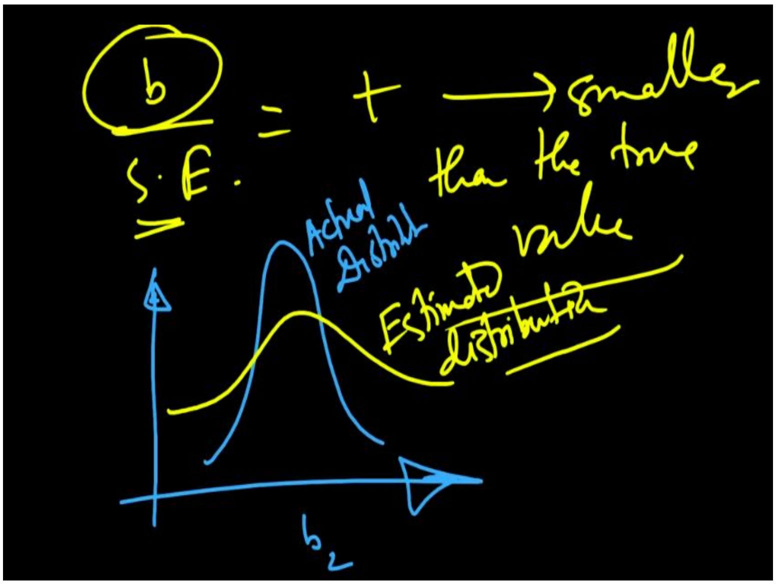

So when my predicted standard is actually inflated and bigger than the actual standard error, the t statistic that we can calculate. So by dividing the coefficient of the standard error, I get the t statistic. So that is going to be actually smaller, smaller than the true value. So because the t stat is going to be smaller, I am going to get a lower P value and that will actually give me a result where my beta coefficient is significant, whereas beta is actually not significant.

I mean, it may not be significant. So basically, I am going to get an invalid model just like the previous case. And if I want to draw the diagram here because the standard is going to inflate it, so if the actual distribution of b 2 was like this, now the true, so the estimated distribution is going to be like this because of the higher standard error. So this is the actual distribution and this is the true distribution, sorry this is the estimated distribution.

This is the erroneous distribution that you have got because of the inclusion of an irrelevant variable. So with this, we have covered the problem of omitted variable bias as well as the problem of inclusion of an irrelevant variable.

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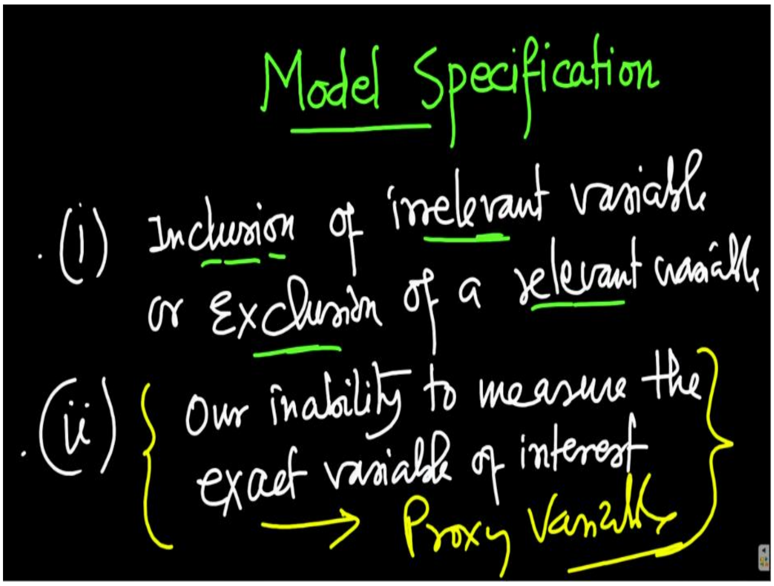

So the third part of model specification which is basically the measurement problem we explained at the beginning of this lecture is that we have this problem of our inability to measure the exact variable, so where we use some other variable called proxy variable. So, in the next lecture, we are going to talk about the proxy variable and the error in the measurement due to the proxy variable and its impact on that. So that is about today's lecture. And with this, we end here. Thank you.