Applied Econometrics
Prof. Tutan Ahmed
Vinod Gupta School of Management
Indian Institute of Technology – Kharagpur

Lecture – 80
Autocorrelation (Contd.)

Hello and welcome back to the lecture on Applied Econometrics. We have been talking about autocorrelation and in the previous couple of lectures, we actually were dealing with data and we have shown how to conduct a Durbin Watson Test using data that might have autocorrelation present.

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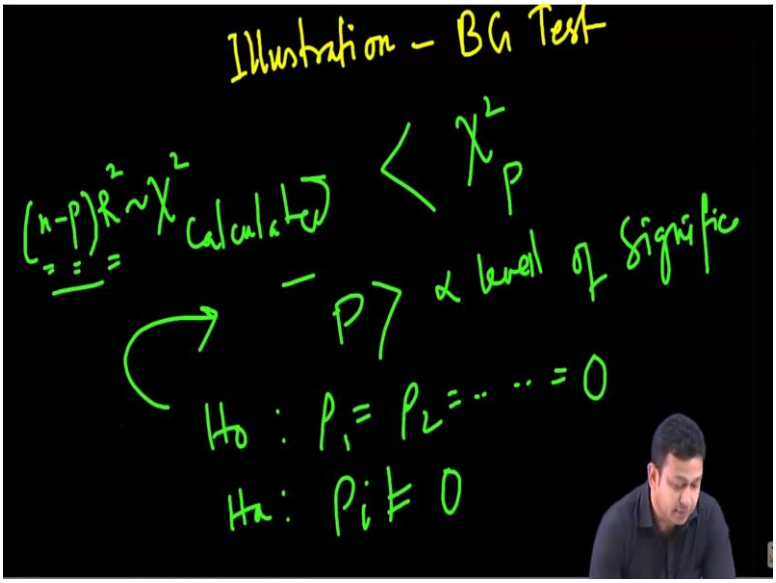

Now, in this lecture we are actually going to talk about Breusch Godfrey Test and using the same data set we are going to perform the Breusch Godfrey Test using both R and stata. So, let us first talk about you know the test statistic that we use in case of Breusch Godfrey Test and we actually compute a chi square value and the chi square value is approximately equal to. So, we get this chi square calculated and that is approximately equal to n – p into R square.

And this n is the total number of observation, p is the number of basically the order of the autoregressive model, that the error term follows R square value that you get from the auxiliary regression. Basically when you run you know when you have u t hat as your dependent variable. So, this is your chi square calculator and if your chi square calculated is

less than chi square for degrees of freedom p, actual chi square value that you get from the table.

Then you say that you actually do not reject the null hypothesis because the and p value that you get basically is going to be higher than your alpha level of significance. So, essentially you say that your null hypothesis here is that null hypothesis is rho = 0. So, all the rhos or you know, if you have multiple rhos of course you can write rho 1, rho 2 and you know n number of rhos, they are going to be is equal to 0. Whereas alternative hypothesis rho I, any of this rho i is not equal to 0.

So that is your ordinary hypothesis. Now, if I have this above. So, I say you do not reject the null hypothesis.

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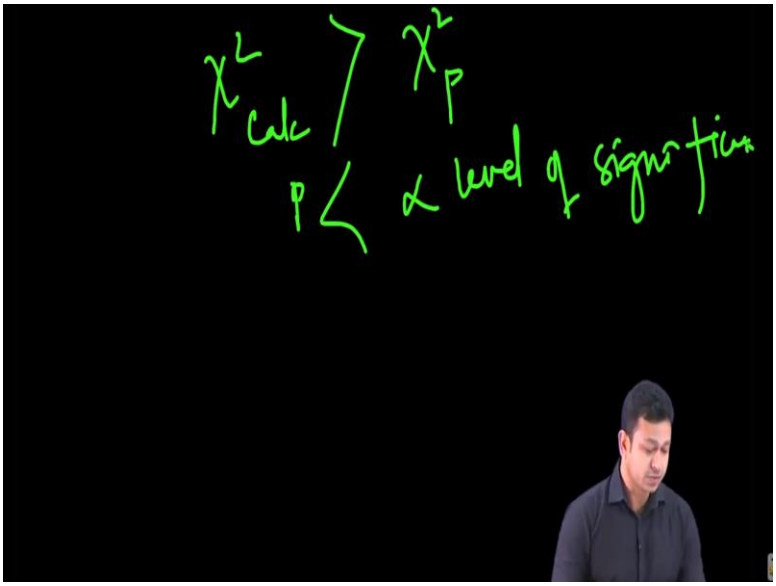

Whereas, if I have the following chi square calculated is bigger than chi square at p degrees of freedom, I would say that my null hypothesis, I reject the hypothesis with the p value is going to be less than the alpha level of significance and you basically reject the null. So, with this we will actually you know we will sort of do the Breusch Godfrey Test both using stata as well as using R.

(Video Starts: 03:41) So, let us start with the stata first and the command like previously what you see, what you have seen for D W test is pretty simple. All you have to do is you have to write after the model B Godfrey. So, b g o d f r e y so that is all you have to write and if you write it, you will get the chi square value 8.036 for degrees of freedom one. So,

degrees of freedom here is essentially the basically the order of your AR model and the p value is pretty low.

So, essentially it shows that your model has autocorrelation. Similarly, if we use R, is just like the D W test, all you have to write here is b g test and you can write the model. And if I write it, I will get a value the Lagrange Multiplier value, L M is 8.036 exactly what you have found in using stata. And you have degrees of freedom 1 and p value is pretty pretty small. So, essentially you say the there is autocorrelation present.

Now, in R you can actually you know also define the order of your autocorrelation. So, if it is AR 1 model, AR 2 model or whatever model you want to see, let us say I write order = 2 instead of 1. So, the previous model was actually one. If I do not write anything it will assume order = 1. So, the result that you get is what you got in the first case but if we have order = 2 of course, the values will change.

But it still says that the autocorrelation significance you can actually test with different order, you can assume different order. And you can sort of input those order you can see what the results are. So, essentially we have seen in using both Breusch Godfrey Test as well as in Durbin Watson Test that the data set we started with that has autocorrelation present. **(Video Ends: 05:59)** Now, what to do with that?

So, given that we have auto correlation, how can we actually resolve auto correlation is the question. In the next lecture we are actually going to talk about how we can resolve autocorrelation, if we have 1? So, with this we will end the lecture here. Thank you.