Note ~~Tests of spec~~

TESTS OF SPECIFICATION ERRORS

It is clear that if there is specification error, the application of the OLS gives bias estimates of the parameters. Since specification error occur due to violation of the important assumption of OLS, therefore, in recent time, econometrics has focused on the developement of test to detect to these specification errors. These tests are known as specification test. Some common tests that we can use to detect specification errors are discussed below ——

P. T. O

Date:- 31/05/2022

(1) Delete in the presence of irrelevent variables (over fitting a model):

Suppose we devloved a K variable model to explain a situation.

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \dots + \beta_K X_{Kt} + U_t$$

However we are not sure that, say, the variable X_K really belongs ~~to~~ in the model. One simple way to find ~~out~~ this out is to taste the significance of the estimated β_K with the usuall t-test. But suppose that we are not sure whether, say X_3 and X_4 ~~has~~ belong in the model. This can easily be done by the F-teste. Thus defecting the presence of irrelevent variable is not a difficult task.

But to carry out these test of significance i.e. t and F. taste we should have a specific model in our mind. The tentitive model which is kept in mind as truth ~~is~~ known as maintained hypothesis. Given that model, we can find out the relevenly of the the dependent variable by the t and F ~~taste~~ test.

However, we shouldn't use t and F test to build a model iteratively i.e. we should not say that initially Y is related to X_2 only because $\hat{\beta}_2$ is statistically significance and the expand the model to include X_3 and decide to keep the variable and model im $\hat{\beta}_3$ terms out to be statistically significance, and so on. This strategy of building a model is called Bottom – up approach or ~~de~~ Data Mining.

The primary objective of data mining is to developed the best model after several tests. However, the process of data mining has been critisised

Date:- 1/6/21

by a number of econometric series.

2. Tests For Omitted variables or exclusion of relevent variables and incorrect functional forms:

(a) Examination of Residuals :-

To delete the model specification errors either due to the ommission of an important variable or incorrect functional form, we can examine the residuals also, particularly in cross sectional data. If there are such errors, a plot of the residuals will exhibit distinct patterns. If the plot of the residuals shows noticeable patterns or pronounced cyclical swings, then it indicates the specification errors. On the other hand, if the residuals become smaller (in absolute value) and residuals plots exhibits lesser cyclical swings, the model will be considered as good model.

(b) Hausman Test :-

In 1978 J.A Hausman (1978) published the ~~influential paper, "Specification Tests in Econometrics"~~ that presented provide a general method of testing of specification error. The idea behind this test is simple. Consider a model with a set of parameters β. Let the null hypothesis H_0 be that the model is correctly specified, with the alternative hypothesis H_1 that the model is misspecified. Consider two estimators $\hat{\beta}$ and $\tilde{\beta}$. $\hat{\beta}$ is consistent, ~~asymptotically~~ and efficient under H_0. $\tilde{\beta}$ is consistent under both H_0 and H_1. But is inefficient under H_0. If the model is correctly specified, then $\hat{\beta}$ and $\tilde{\beta}$ should have similar values. If the model is misspecified, then $\hat{\beta}$ and $\tilde{\beta}$ should differ.

(56)

Date: 5/9/22

(c) White's Test :-

H. White developed a pair of specification tests that are based on the Hausman principle. The first test is called the information matrix ~~test~~ test or simply the IM test. Rather than comparing two estimates of the structural coefficients β, the IM test compares two estimates of the information matrix.

(d) Ramsey's RESET Test :

Ramsey's RESET (Regression Specification Error test) is similar in purpose to White's test for functional form. The RESET test is based on the notion that if the functional form of the model is incorrect, then the correct specification might be approximated by the inclusion of powers of the variables in the original model. The original set of independent variables is augmented by powers of these variables. If the coefficients associated with the added variables are statistically significant ~~misspecification~~ misspecification from sources such as incorrect functional form or the exclusion of relevant variables suggested.

Besides these tests, some other tests like Lagrange multiplier test, Durbin - Watson 'd' statistics etc. can also be used to detect specification errors.