APPENDIX G

Ramsey's RESET Test

Under such specification errors, LS estimators will be biased and inconsistent, and conventional inference procedures will be invalidated. Ramsey (1969) showed that any or all of these specification errors produce a non-zero mean vector for ε. Therefore, the null and alternative hypotheses of the RESET test are

$$H_0 : \varepsilon - N(0, \sigma^2 I)$$

$$H_1 : \varepsilon - N(0, \sigma^2 I) \quad \text{and} \quad \mu \neq 0$$

The test is based on an augmented regression

$$y = X\beta + Z\gamma + \varepsilon$$

The test of specification error evaluates the restriction $\gamma = 0$. The crucial question in constructing the test is to determine what variables should enter the Z matrix. Note that the Z matrix may, for example, be comprised of variables that are not in the original specification, so that the test of $\gamma = 0$ is simply the omitted variables test described above.

A Taylor series approximation of the multiplicative relation would yield an expression involving powers and cross-products of the explanatory variables. Ramsey's suggestion is to include powers of the predicted values of the dependent variable (which are, of course, linear combinations of powers and cross-product terms of the explanatory variables) in Z:

$$Z = [\hat{y}^2, \hat{y}^3, \hat{y}^4, \ldots]$$

where $\hat{y}$ is the vector of fitted values from the regression of y on X. The superscripts indicate the powers to which these predictions are raised. The first power is not included since it is perfectly collinear with the Z matrix.

The fitted terms are the powers of the fitted values from the original regression, starting with the square or second power. For example, if you specify 1, then the test will add $\hat{y}^2$ in the regression and if you specify 2, then the test will add $\hat{y}^2$ and $\hat{y}^3$ in the regression and so on.