Applied Econometrics II
Dept of Economics, Carnegie Mellon University
73-360, Fall 2000-2001

Solution #3

We are interested in modeling hospital costs as a function of inpatient days, outpatient visits and time. Since we would like to measure elasticities, please use log-log regression (do not log time). Please measure time as the number of quarters since the first quarter in the data.

Please calculate the following:

- **an estimate and 90% CI for the elasticity of costs w.r.t. outpatient visits.**

  First, assuming homoskedasticity, we look at page 2 of the output and calculate the 90% CI as:

$$\begin{aligned} \beta_{\text{visits}} &= 0.669 \pm 1.645(0.006) \\ &= 0.669 \pm 0.01 \end{aligned}$$

  Next, assuming heteroskedasticity, we look at page 4 of the output and calculate the 90% CI:

$$\begin{aligned} \beta_{\text{visits}} &= 0.669 \pm 1.645 \left(\sqrt{0.000080}\right) \\ &= 0.669 \pm 0.015 \end{aligned}$$

  Looking at the results of White's test on page 3, we find that $NR^2 = 7535(0.2642) = 1991$. This is significant at any level in the χ^2_9 table. So, we should reject the null of homoskedasticity and use the heteroskedastic-consistent results.

- **an estimate and 90% CI of "economies of scale" An measure of scale economies (the % that costs rise when outputs all rise by 1%) is the sum of the coefficients of the different outputs.**

  Using the assumption of homoskedasticity, we look at page 2. First, we need the standard error of $\hat{\beta}_{\text{days}} + \hat{\beta}_{\text{visits}}$. This we find using the variance matrix: $\sqrt{0.0000326 + 0.0000376 + 2(-0.0000251)} = 0.004$. Thus, a 90% CI for the scale economies is:

$$\begin{aligned}\beta_{\text{days}} + \beta_{\text{visits}} &= 0.983 \pm 1.645\,(0.004) \\ &= 0.983 \pm 0.007\end{aligned}$$

For the heteroskedastic assumption, we do the same thing, but with the output on page 4. First, we need the standard error of $\hat{\beta}_{\text{days}} + \hat{\beta}_{\text{visits}}$. This we find using the variance matrix: $\sqrt{0.0000919 + 0.0000797 + 2(-0.0000605)} = 0.007$. Thus, a 90% CI for the scale economies is:

$$\begin{aligned}\beta_{\text{days}} + \beta_{\text{visits}} &= 0.983 \pm 1.645\,(0.007) \\ &= 0.983 \pm 0.012\end{aligned}$$

Again, White's test shows that the heteroskedastic assumption is better.

Please do both of these tasks assuming homoskedasticity and assuming heteroskedasticity. Which of the two sets of results is preferable and why (you are expected to do set up and perform some test to answer this part)?