

**Econometrics I**  
**Fall 2004**  
**Assignment 3**

*Today's Date: September 28*

*Due Date: October 5*

*Please show all of your work and clearly indicate your final response to each question. You are to write your own GAUSS (or MATLAB, Fortran, etc.) program in answering each of the computational questions.*

In questions 1-4, you are to consider estimation of models of the general form

$$y = X\beta + \varepsilon,$$

where  $X$  is a  $(N \times k)$  deterministic matrix,  $\beta$  is an unknown  $(k \times 1)$  vector and  $\varepsilon$  is a  $(n \times 1)$  vector of disturbance terms with the property  $E(\varepsilon|X) = 0$  and  $E(\varepsilon\varepsilon'|X) = D$ , where  $D$  is an  $n \times n$  diagonal matrix.

1. We know that the OLS estimator of  $\beta$ ,  $\hat{\beta}$ , is unbiased in this case. Provide conditions that ensure that  $\hat{\beta}$  is also a consistent estimator of  $\beta$ . For this problem you can assume that  $D$  is known.
2. Can we consistently estimate the conditional variance function  $V(\varepsilon|X)$  without imposing functional form assumptions on it? (Note that we have already imposed functional form assumptions on the conditional mean function by positing that  $E(Y|X) = X\beta$ .) What conditions on  $X$  are required to form a consistent nonparametric estimator of this function?
3. Using the data set `ecn1_wag`, estimate the regression specification

$$\ln w = \beta_0 + \beta_1 \text{Male} + \beta_2 \text{Less\_HS} + \beta_3 \text{HS\_Dip} + \varepsilon,$$

where  $\varepsilon$  is mean independent of the  $X$  and the covariance matrix of the  $\varepsilon$  is the diagonal matrix  $D$ . Estimate  $\beta$  using OLS and obtain the "correct" asymptotic standard errors of  $\hat{\beta}$ .

4. Is it possible to nonparametrically estimate the conditional variance function associated with this regression specification? If so, obtain consistent estimates of this function. Without necessarily conducting a formal test, do your estimates appear to support a homoskedasticity assumption?

5. Ruud 8.3
6. Ruud 8.13
7. Ruud 10.5