UNIVERSITY OF NORTH CAROLINA
Department of Economics

Economics 275 — Dr. Gallant
Homework 7 — Fall 2000
Due November 29, 2000

For the Berndt-Wood nonlinear factor demand system with symmetry imposed

$$
\begin{aligned}
q(y,x,\theta) &= e \\
\text{endogenous: } y &= (M_K, M_L, M_E, M_M, \ln P_K, \ln P_L, \ln P_E, \ln P_M)' \\
\text{exogenous: } x &= (1, z_1, \cdots, z_{10})' \\
\text{parameters: } \theta &= (\theta_1, \theta_2, \cdots, \theta_{13})'
\end{aligned}
$$

$$
q(y,x,\theta) = \begin{pmatrix}
\ln(M_K/M_M) - \ln \frac{\theta_1+\theta_2 \ln P_K+\theta_3 \ln P_L+\theta_4 \ln P_E+\theta_5 \ln P_M}{1+\theta_5 \ln P_K+\theta_9 \ln P_L+\theta_{12} \ln P_E+\theta_{13} \ln P_M} \\
\ln(M_L/M_M) - \ln \frac{\theta_6+\theta_3 \ln P_K+\theta_7 \ln P_L+\theta_8 \ln P_E+\theta_9 \ln P_M}{1+\theta_5 \ln P_K+\theta_9 \ln P_L+\theta_{12} \ln P_E+\theta_{13} \ln P_M} \\
\ln(M_E/M_M) - \ln \frac{\theta_{10}+\theta_4 \ln P_K+\theta_8 \ln P_L+\theta_{11} \ln P_E+\theta_{12} \ln P_M}{1+\theta_5 \ln P_K+\theta_9 \ln P_L+\theta_{12} \ln P_E+\theta_{13} \ln P_M}
\end{pmatrix}
$$

use the data in file klem.dat and documented in file klem.doc which are available either by anonymous ftp from ftp.econ.duke.edu in directory pub/arg/data or by clicking "Browse ftp site" on the course web page, to estimate the elasticity of substitution of capital for energy

$$\hat{\sigma}_{KE} = 1 + \hat{\theta}_4/(\hat{M}_K \hat{M}_E)$$

$$\hat{M}_K = \hat{\theta}_1 + \hat{\theta}_2 \ln P_K + \hat{\theta}_3 \ln P_L + \hat{\theta}_4 \ln P_E + \hat{\theta}_5 \ln P_M$$

$$\hat{M}_E = \hat{\theta}_{10} + \hat{\theta}_4 \ln P_K + \hat{\theta}_8 \ln P_L + \hat{\theta}_{11} \ln P_E + \hat{\theta}_{12} \ln P_M$$

for the year 1959 using three stage least squares and set a 95% confidence interval on your estimate.