

**EE325 Section 1 Quiz 6 Due date: November 25, 2022 by email.**

Name: \_\_\_\_\_ Last 4-digits Student ID: \_\_\_\_\_

1. For pedagogic purposes Hanushek and Jackson estimate the following model:

$$C_t = \beta_1 + \beta_2 GNP_t + \beta_3 D_t + u_t \quad (1)$$

Where  $C_t$  = aggregate private consumption expenditure in year t

$GNP_t$  = GNP in year t

$D_t$  = national defense expenditures in year t

The objective of the analysis being to study the effect of defense expenditure on other expenditures in the economy.

Postulating that  $\sigma_t^2 = \sigma^2(GNP_t)^2$ , they transform (1) and estimate

$$C_t/GNP_t = \beta_1 (1/GNP_t) + \beta_2 + \beta_3 (D_t/GNP_t) + (u_t/GNP_t) \quad (2)$$

The empirical results based on the data for 1946-1975 were as follows (standard errors in the parentheses):

$$\begin{aligned} \widehat{C}_t &= 26.19 + 0.6248 GNP_t - 0.4398 D_t \\ &\quad (2.73) \quad (0.0060) \quad (0.0736) \\ R^2 &= 0.999 \end{aligned}$$

$$\begin{aligned} \widehat{C_t/GNP_t} &= 25.92 (1/GNP_t) + 0.6246 - 0.4315 (D_t/GNP_t) \\ &\quad (2.22) \quad (0.0068) \quad (0.0597) \\ R^2 &= 0.875 \end{aligned}$$

- a. What assumption is made by the authors about the nature of heteroscedasticity? Can you justify it?
- b. Compare the results of the two regressions. Has the transformation of the original model improved the results, that is, reduced the estimated standard errors? Why or why not?
- c. Can you compare the two  $R^2$  values? Why or why not?