

Revision 1

Problem 1. Consider the model:

$$\begin{aligned}\log(wage) = & \beta_0 + \beta_1 female + \beta_2 education + \beta_3 female \cdot education \\ & + \beta_4 exper + \beta_5 exper^2 + \beta_6 tenure + \beta_7 tenure^2 + u\end{aligned}$$

The estimated model is:

$$\begin{aligned}\widehat{\log(wage)} = & 0.389 - 0.227female + 0.082education + 0.056female \cdot education \\ & (0.119) \quad (0.168) \quad (0.008) \quad (0.0131) \\ & + 0.029exper - 0.00058exper^2 + 0.032tenure - 0.00059tenure^2 \\ & (0.005) \quad (0.00011) \quad (0.007) \quad (0.00024)\end{aligned}$$

- What is the estimated return to education for men and for women?
- Test the hypothesis that the return to education is the same for men and women using a 5% significance level.
- Interpret the parameter estimate associated with female.
- What other regression do you need to run to test the null hypothesis that, holding the other factors fixed, tenure has no effect on wage?
- Consider the Lagrange Multiplier (LM) test for testing the restriction in (d). What are the steps to construct the LM test statistic?
- Find the value of *education* such that the predicted values of $\log(wage)$ are the same for men and women.

Problem 2. Consider the model:

$$gfr_t = \beta_0 + \beta_1 pe_t + \beta_2 pe_{t-1} + \beta_3 pe_{t-2} + \beta_4 ww2_t + \beta_5 pill_t + u_t,$$

where u_t is a white noise with mean zero and variance σ_u^2 ; gfr is the general fertility rate (the number of children born to every 1000 women of childbearing age) observed quarterly; pe personal tax exemption; $ww2$ takes the value 1 during the years 1941 and 1945; $pill$ takes the value 1 from 1963.

The estimated model is:

$$\begin{aligned} \widehat{gfr}_t &= 95.87 + 0.073pe_t - 0.0058pe_{t-1} + 0.034pe_{t-2} - 22.13ww2_t - 31.30pill_t & (1) \\ &= (3.28) \quad (0.126) \quad (0.1557) \quad (0.126) \quad (10.73) \quad (3.98) \end{aligned}$$

- (a) What is the name of this model?
- (b) What is the estimated long-run propensity (LRP)?
- (c) What regression do you need to run to obtain the standard error of the estimate of the LRP?
- (d) You suspect gfr has quarterly patterns (seasonality). Write the model that considers this phenomena.
- (e) You suspect that there is heteroskedasticity in your data. Write down the regression needed for White's test of heteroskedasticity.