

Economics 471: Econometrics

Department of Economics, Finance and Legal Studies
University of Alabama

Problem Set #6

1. Using the data in SLEEP75.RAW, we obtain the estimated equation

$$\widehat{sleep} = 3,840.83 - 0.163totwrk - 11.71educ - 8.70age + 0.128age^2 + 87.75male$$

where *sleep* is total minutes per week spent sleeping at night, *totwrk* is total weekly minutes spent working, *educ* and *age* are measured in years, and *male* is a gender dummy.

- (a) Replicate the results.
 - (b) All other factors being equal, is there evidence that men sleep more than women? How strong is the evidence?
 - (c) Is there a statistically significant trade-off between working and sleeping?
 - (d) What other regression do you need to run to test the null hypothesis, that holding other factors, fixed, age has no effect on sleeping?
 - (e) What is the partial effect of age on sleep?
2. Using the data in GPA2.RAW, the following equation can be estimated

$$\widehat{sat} = 1,028.10 + 19.30hsize - 2.19hsize^2 - 45.09female - 169.81black + 62.32female \cdot black$$

where *sat* is the combined SAT score, *hsize* is size of the student's high school graduating class, in hundreds, *female* is a gender dummy variable, and *black* is a race dummy variable equal to one for blacks and zero otherwise.

- (a) Replicate the results.
- (b) Is there strong evidence that $hsize^2$, should be included in the model? From this equation, what is the optimal high school size?
- (c) Holding *hsize* fixed, what is the estimated difference in SAT score between nonblack females and nonblack males? How statistically significant is this estimated difference?
- (d) What is the estimated difference in SAT score between nonblack males and black males? Test the null hypothesis that there is no difference between their scores, against the alternative that there is a difference.
- (e) What is the estimated difference in SAT score between black females and nonblack females? What would you need to do to test whether the difference is statistically significant?

3. Consider the equation

$$colgpa = \alpha + \beta_1 hsize + \beta_2 hsize^2 + \beta_3 hsperc + \beta_4 sat + \beta_5 female + \beta_6 athlete + u$$

where *colgpa* is cumulative college grade point average, *hsize* is size of high school graduating class, in hundreds, *hsperc* is academic percentile in graduating class, *sat* is combined SAT score, *female* is a binary gender variable, and *athlete* is a binary variable, which is one for student-athletes.

- (a) What are your expectations for the coefficients in this equation?
- (b) Using GPA2.RAW, estimate the equation and report the results. What is the estimated GPA differential between athletes and non-athletes? Is it statistically significant?
- (c) Drop *sat* from the model and reestimate the equation. Now, what is the estimated effect of being an athlete? Discuss why the estimate is different than that obtained in part (b).
- (d) In the model from part (a), allow the effect of being an athlete to differ by gender and test the null hypothesis that there is no ceteris paribus difference between women athletes and women non-athletes.
- (e) Does the effect of *sat* on *colgpa* differ by gender? Justify your answer.