ECO 5350 Prof. Tom Fomby
Introductory Econometrics Fall 2007

TOPICS TO CONSIDER
FOR MID-TERM II

The second Mid-term in this class is scheduled for Tuesday, October 30, 2007 at the regular class time. The material for this exam is contained in Chapters 5 – 7 of your textbook and in my Lecture Notes 10 – 14 and 17 – 19 that are posted on the class website. Also we have had Exercises 4 – 7 and QQs 6 to the present since the last exam. Although we may have time to discuss heteroskedasticity and Weight Least Squares briefly before the exam, I am going to reserve testing on these subjects until the final exam. So here are some of the major topics we discussed since the first mid-term.

1. **Prediction in regression**. There are three types of prediction problems: (1) Prediction of the mean of Y given a certain setting of X = X_0, (2) Prediction of the next value of Y given a certain setting of X = X_0, and (3) Prediction of the next value of Y given an uncertain setting of X around $X = X_0$. See Lecture Notes 18 and Exercise 4.
2. **The interpretation of Coefficients in various linear regression equations.** See Lecture Notes 10 on the class website. Also see Lecture Notes 17 for **interpreting regression models with quadratic terms**.
3. You need to understand the logic of the **Frisch-Waugh theorem**. This theorem tells us that any OLS multiple regression coefficient of any particular explanatory variable can be obtained by utilizing two regressions: (1) Obtain the residuals produced by regressing the dependent variable on the "other" explanatory variables in the regression equation and (2) Obtain the residuals produced by regressing the explanatory variable in question on the "other" explanatory variables in the regression equation and then finally (3) running the residuals of step (1) on the residuals of step (2) in a regression **through the origin.** This latter regression will produce a regression coefficient that is the same as that which would be produced by minimizing the sum of squares error function and solving (k+1) non-homogenous equations in the (K+1) unknowns $\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2, \cdots, \hat{\beta}_k$. The nice thing about the Frisch-Waugh theorem is that it gives you the knowledge that multiple regression is attempting to properly account for the effects of other variables when analyzing the effect of a given variable on a dependent variable. In essence, multiple linear regression is conducting partial correlation analysis of a dependent variable with selected explanatory variables. For computer demonstration of this theorem see the program Alternative.sas on the class website. Also you can refer to the Lecture Notes 11 that report an equivalent version of the Frisch-Waugh theorem.
4. You need to understand how including a time trend in a multiple regression involving time series variables that themselves contain trends, helps reduce the incidence of spurious regression results. This is an **application** of the Frisch-Waugh theorem. What is the definition of a **spurious regression**?
5. **Specification Analysis**. What are the effects on the OLS estimates of the **inclusion of an irrelevant variable**? What are the effects on the OLS estimates of **the omission of a relevant variable**? See Lecture Notes 12 on the class website.

6. You should know how to conduct a test of **a linear hypothesis** in multiple regression. See Lecture Notes 13 and Exercise 5.
7. You should know how to conduct **joint linear hypotheses** in multiple regression. See Lecture Notes 14 and Exercise 6.
8. What effect does **multicollinearity** among the explanatory variables in a regression equation have on the OLS estimates? How might multicollinearity be detected? How does multicollinearity often manifest itself in a multiple regression equation? How might it be overcome? See Section 6.7 in your textbook.
9. What is a **dummy variable**? What is a **reference group**? What is an **additive dummy**? A **multiplicative dummy**? What is the **dummy variable trap**? How can it be avoided? See Lecture 19 notes.
10. What is **the additive/multiplicative dummy variable form of a multiple regression**? Given, say two explanatory variables, could you write out an additive/multiplicative form of the regression equation? See Lecture 19 notes.
11. The **Chow test for Structural Change** can be constructed using either the **separate/pooled regressions approach** or by performing a **subset F-test on the additive and multiplicative dummies** of the additive/multiplicative dummy variable form of a multiple regression. Given a computer output, you should be able to compute a Chow F-statistic and know how to calculate the numerator and denominator degrees of freedom for the test. What is the **null hypothesis of the test**? What is the **alternative hypothesis of the test**? See Exercise 7 and Lecture 19 notes.

Study hard and good luck on your exam. TF.