Theory and Applications for Econometrics

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January 27, 2010

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Final Exam Preparation & Questions for Review
v1.0 - Subject to Change

1 Final Exam

The final examination will take place in the computer lab and is going to include a real-time, real-world data analysis and commentary. You will be required to do (and be given marks for) the following:

1. Locate and download the data file and the exam file (the exam will also be given as a handout).
2. Import the data into Gretl.
3. Perform all calculations and modeling steps, as indicated by the exam instructions.
4. Copy all that is required (results, figures etc.) from Gretl into MS-Word.
5. Write appropriate commentary on your results, as indicated by the exam instructions. The commentary can be written in English or Greek; bonus points will be given if the commentary is written fully in English.

6. Answer (a maximum of five) short theoretical, but non-technical, questions.

7. Save the Gretl file with your computations and the MS-Word file and email it to thomakos@uop.gr at the end of the exam.

2 Review Questions

Please note that all handouts that were given during the lectures are part of the material that you should study for your final exam.

1. What is the usefulness of econometric analysis?

2. What is the concept of conditional expectation and why is it useful for econometric modeling?

3. What is the concept of an econometric model and hwo does it relate to the conditional expectation?

4. Does the use of the conditional expectation imply a linear model? How can you justify the assumption of linearity as an approximation?

5. What is the form of the general linear model (GLM)? Explain in detail the concepts of a dependent variable, explanatory variables, model error term, model parameters.

6. Which are the standard assumptions that are made in the context of the GLM? Explain them.

7. What methods do you know for estimating the unknown parameters of the GLM? Under the standard assumptions do these methods give identical estimators or not?

8. What is the interpretation of the least squares (LS) estimator for the parameters of the GLM? Compare the LS estimators of the simple linear model (with one explanatory variable) with the LS estimators of the GLM: do they have the same interpretation?

9. What is the (conditional) variance-covariance matrix of the LS estimators and which assumptions are necessary for its derivation? What is the interpretation of this matrix?

10. Which are the properties of the LS estimators? Explain each one and comment on their relative importance - remember to state on which assumptions these properties rely on. Do you see the similarities between the simple linear model and the GLM with respect to the properties of the LS estimators?

11. How can we compute fitted values and predictions using the LS estimators?

12. What are the residuals of the GLM? The estimator of which parameter uses the residuals?

13. How do we measure the fit of the model? Explain the concept of the coefficient of determination and give its interpretation.

14. What is the difference between an estimator and an estimate? Explain.

15. How do you check the individual statistical significance of the LS estimates? Explain in detail how do you compute the standard errors of the estimates, the corresponding t-statistics and confidence intervals. Then, explain the concept of p-value.

16. How do you check the joint statistical significance of all the LS estimates (i.e. the significance of the model)? Explain in detail the use of the residual sum of squares in the context of an unrestricted and a restricted model and the F-statistic for performing joint tests of significance on multiple restrictions.

17. After estimating a GLM and making an initial assessment of the significance of it, you need to perform a number of specification tests; what are the categories for these tests?

18. Examination of the residuals after estimation is important; why is that? Explain the residual diagnostic tests that you would use to assess the properties of the residuals and link them with the standard assumptions that you make in the context of the GLM.

19. Suppose that you find that you residuals do not have a normal distribution; is that a problem? Explain why or why not.

20. Suppose that you find that your residuals have heteroscedasticity and/or autocorrelation. Do the presence of heteroscedasticity and/or autocorrelation create any problems to your

previous inferences (e.g. about the statistical significance of your model)? How do these two properties affect the LS estimators? How can you correct for the presence of heteroscedasticity and autocorrelation? Describe the approach based on the correction of the LS variance-covariance matrix and the approach based on Generalised Least Squares (GLS) estimators.

21. Discuss in detail the implications of the presence of residual autocorrelation and dynamic modeling. Then, show how a dynamic model can be solved to produce a static one; give the interpretations of the coefficients in these two models.

22. Why is it important to perform tests for the structural stability of the coefficients of a GLM?

23. If the assumption of absence of correlation between the explanatory variables and the error term is violated how can you proceed? How are the LS estimators affected by this violation? What is the alternative method of estimation?

24. Describe in detail how can a situation as in the previous question might arise in practice (i.e. an example of model that has endogeneity problems).

25. In instrumental variables (IV), equivalently two stage least squares (2SLS), estimation there is a crucial issue of the choice of instrumental variables. Describe in some detail how one proceeds in selecting such variables and the problems that may arise. You can use examples to justify your answers.