**UNIVERSIDAD CARLOS III DE MADRID**

**ECONOMETRICS I**

**Academic year 2007/08**

**EXTRAORDINARY FINAL EXAM**

**September, 6th, 2008**

- TIME: 2 HOURS 30 MINUTES

Directions:

- BEFORE YOU START TO ANSWER THE EXAM:
  - Fill in your personal information in the optical reading form, which will be the only valid answering document. Remember that you must complete all your identifying data (name and surname(s), and **NIU**, which has 9 digits and always begins by 1000) both in letters and in the corresponding optical reading boxes.
  - Fill in, both in letters and in the corresponding optical reading boxes, the course code (10188) and your group (65 or 75). Also check that you have indicated the **type of exam** you are answering.
- AT THE END OF THE EXAM, YOU MUST HAND OUT THE THE OPTICAL READING FORM, TOGETHER WITH THE QUESTIONNAIRE AND THE PROBLEM SET.
- **Check that this document contains 3 exercises and the questionnaire 34 questions sequentially numbered.**
- Check that the number of exam type that appears in the questionnaire matches the number indicated in the optical reading form.
- Read the questions carefully.
  **Whenever a question is referred to a Problem included in the enclosed document, the question will include within parentheses at the beginning of the question the corresponding problem number.**
  It is advised to read carefully the text of the problem before answering its corresponding questions.
- For each row regarding the number of each question, fill the box which corresponds with your chosen option in the optical reading form .
- **Each question, that must be answered filling the box which corresponds to the chosen option, only has one correct answer (A, B, C or D).**
  Any question in which more than one answer is selected will be considered incorrect and its score will be zero.
- To obtain a grade of 5 over 10 you must correctly answer **20 questions**.

- If you wish, you may use the answer table as a draft, although such table does not have any official validity.
- You can use the back side of the problem text as a draft (no additional sheets will be handed out).
- The relevant **statistical tables** are attached at the end of the Problem text document.

- **Any student who were found talking or sharing any sort of material during the exam will be expelled out immediately and his/her overall score will be zero, independently of any other measure that could be undertaken.**

- **Date of grades publication**: Monday, September, 15th.
- **Date of exam revision**: Thursday, September, 18th, at 18:00 h, classroom 15.1.3.
- **Rules for exam revision**:
  - Its only purpose will be to check that the number of correct answers is right.
  - To be entitled for revision, the student should bring a *printed copy* of the exam solutions, which will be available in Aula Global from the date of grades publication.
  - Any complaint about hypothetical errors in the exam contents with respect to the official solutions must be done in writing. The complaint sheet must be hand in at the moment of the exam revision, indicating name and surname, NIU, and university e-mail address. After the exam revision, no complaint will be accepted in any case. If, in a five days time, the complaint were not answered and/or the grade were not amended in Aula Global, it must be understood that the complaint has been disregarded, what would end up the complaint procedure to the course professor.

| Preliminary ANSWERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **QUESTION** | **(a)** | **(b)** | **(c)** | **(d)** | **QUESTION** | **(a)** | **(b)** | **(c)** | **(d)** |
| **1.** | | | | | **18.** | | | | |
| **2.** | | | | | **19.** | | | | |
| **3.** | | | | | **20.** | | | | |
| **4.** | | | | | **21.** | | | | |
| **5.** | | | | | **22.** | | | | |
| **6.** | | | | | **23.** | | | | |
| **7.** | | | | | **24.** | | | | |
| **8.** | | | | | **25.** | | | | |
| **9.** | | | | | **26.** | | | | |
| **10.** | | | | | **27.** | | | | |
| **11.** | | | | | **28.** | | | | |
| **12.** | | | | | **29.** | | | | |
| **13.** | | | | | **30.** | | | | |
| **14.** | | | | | **31.** | | | | |
| **15.** | | | | | **32.** | | | | |
| **16.** | | | | | **33.** | | | | |
| **17.** | | | | | **34.** | | | | |

## PROBLEM 1. ECONOMY OPENNESS

The following model is a system of simultaneous equations to study whether the openness of the economy (*open*) leads to lower inflation rates ($inf$),

$$\begin{aligned} inf &= \delta_{10} + \gamma_{12} open + \delta_{11} \log(pcinc) + u_1 \\ open &= \delta_{20} + \gamma_{21} inf + \delta_{21} \log(pcinc) + \delta_{22} \log(land) + u_2. \end{aligned}$$

We assume that (the logarithms of) *pcinc* (per capita income) and *land* (land for farming) are exogenous in the whole exercise.

The following estimations have been obtained by OLS and 2SLS.

**Output 1:** OLS estimation using the 114 observations 1–114
Dependent variable: inf

| Variable | Coefficient | Standard Dev. | $t$ statistic | p-value |
|---|---|---|---|---|
| const | 25,1040 | 15,2052 | 1,6510 | 0,1016 |
| open | −0,215070 | 0,0946289 | −2,2728 | 0,0250 |
| lpcinc | 0,0175673 | 1,97527 | 0,0089 | 0,9929 |

| | |
|---|---|
| Mean of dependent variable | 17,2640 |
| Std. dev. of dependent variable | 23,9973 |
| Residual sum of squares | 62127,5 |
| Residual standard deviation ($\hat{\sigma}$) | 23,6581 |
| $R^2$ | 0,0452708 |
| $\bar{R}^2$ corrected | 0,0280685 |
| $F(2, 111)$ | 2,63167 |
| p-value for $F()$ | 0,0764453 |

**Output 2:** OLS estimation using the 114 observations 1–114
Dependent variable: open

| Variable | Coefficient | Standard Dev. | $t$ statistic | p-value |
|---|---|---|---|---|
| const | 116,226 | 15,8808 | 7,3187 | 0,0000 |
| inf | −0,0680353 | 0,0715556 | −0,9508 | 0,3438 |
| lpcinc | 0,559501 | 1,49395 | 0,3745 | 0,7087 |
| lland | −7,3933 | 0,834814 | −8,8563 | 0,0000 |

| | |
|---|---|
| Mean of dependent variable | 37,0789 |
| Std. dev. of dependent variable | 23,7535 |
| Residual sum of squares | 34865,3 |
| Residual standard deviation ($\hat{\sigma}$) | 17,8033 |
| $R^2$ | 0,453162 |
| $\bar{R}^2$ corrected | 0,438249 |
| $F(3, 110)$ | 30,3855 |
| p-value for $F()$ | $< 0{,}00001$ |

**Output 3:** OLS estimation using the 114 observations 1–114
Dependent variable: inf

| Variable | Coefficient | Standard Dev. | $t$ statistic | p-value |
|---|---|---|---|---|
| const | −12,615 | 21,0313 | −0,5998 | 0,5498 |
| lpcinc | 0,191394 | 1,98158 | 0,0966 | 0,9232 |
| lland | 2,55380 | 1,08049 | 2,3635 | 0,0198 |

| | |
|---|---|
| Mean of dependent variable | 17,2640 |
| Std. dev. of dependent variable | 23,9973 |
| Residual sum of squares | 61903,2 |
| Residual standard deviation ($\hat{\sigma}$) | 23,6154 |
| $R^2$ | 0,0487174 |
| $\bar{R}^2$ corrected | 0,0315772 |
| $F(2, 111)$ | 2,84229 |
| p-value for $F()$ | 0,0625432 |

**Output 4:** OLS estimation using the 114 observations 1–114
Dependent variable: open

| Variable | Coefficient | Standard dev. | $t$ statistic | p-value |
|---|---|---|---|---|
| const | 117,085 | 15,8483 | 7,3878 | 0,0000 |
| lpcinc | 0,546479 | 1,49324 | 0,3660 | 0,7151 |
| lland | −7,5671 | 0,814216 | −9,2937 | 0,0000 |

| | |
|---|---|
| Mean of dependent variable | 37,0789 |
| Std. dev. of dependent variable | 23,7535 |
| Residual sum of squares | 35151,8 |
| Residual standard deviation ($\hat{\sigma}$) | 17,7956 |
| $R^2$ | 0,448668 |
| $\bar{R}^2$ corrected | 0,438734 |
| $F(2, 111)$ | 45,1654 |
| p-value for $F()$ | $< 0,00001$ |

**Output 5:** 2SLS estimation using the 114 observations 1–114
Dependent variable: inf
Instruments: lland

| Variable | Coefficient | Standard dev. | $t$ statistic | p-value |
|---|---|---|---|---|
| const | 26,8993 | 15,4012 | 1,7466 | 0,0807 |
| open | −0,337487 | 0,144121 | −2,3417 | 0,0192 |
| lpcinc | 0,375823 | 2,01508 | 0,1865 | 0,8520 |

| | |
|---|---|
| Mean of dependent variable | 17,2640 |
| Std. dev. of dependent variable | 23,9973 |
| Residual sum of squares | 63064,2 |
| Residual standard deviation ($\hat{\sigma}$) | 23,8358 |
| $F(2, 111)$ | 2,62498 |
| p-value for $F()$ | 0,0769352 |

Hausman Test –
Null hypothesis: OLS estimates are consistent
Asymptotic test statistic: $\chi^2_1 = 1,35333$
with p-value = 0,244697

First-stage $F(1, 111) = 86,3734$

**PROBLEM 2. CLASS ATTENDANCE.**

A researcher wishes to explain the standardized result of a final exam (*stndfnl*) for a sample of students. She has data on the percentage of attendance to classes, the average grade from previous courses (*priGPA*) and the grade obtained in the test for university access ($ACT$). To make valid inference, she tries different models, but at the end she concentrates on the following two models:

$$stndfnl = \beta_0 + \beta_1 atndrte + \beta_2 \log(priGPA) + \beta_3 \log(ACT) + u \tag{1}$$

$$\begin{aligned} stndfnl &= \beta_0 + \beta_1 atndrte + \beta_2 priGPA + \beta_3 ACT + \beta_4 priGPA^2 + \\ &\quad + \beta_5 ACT^2 + u \end{aligned} \tag{2}$$