Universidad Carlos III de Madrid
ECONOMETRICS I
Academic year 2008/09
FINAL EXAM (2nd call)
September, 1, 2009

Exam type: 1

TIME: 2 HOURS 30 MINUTES

Directions:

- BEFORE YOU START TO ANSWER THE EXAM:
  - Fill in your personal data in the optical reading form, which will be the only valid answering document. Remember that you must complete all your identifiying data (name and surname(s), and **NIU**, which has 9 digit 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).
- **Check that this document contains 60 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 problem text and the questions carefully.
  The first 25 questions are referred to Problem 1, and the remaining questions correspond to Problem 2
- For each row regarding the number of each question, fill the box which corresponds with your chosen option in the optical reading form (A, B, C or D).
- **Each question only has one correct answer.**
  Any question in which more than one answer is selected will be considered incorrect and its score will be zero.
- All the questions correctly answered have the same score. Any incorrect answer will score as zero. To obtain a pass (at least 5 over 10) you must correctly answer **35** questions. In the 2nd call (september), no complementary grades obtained during the course are considered.
- 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).
- **Any student who were found talking or sharing any sort of material during the exam will be expelled out inmediately and his/her overall score will be zero, independently of any other measure that could be undertaken.**

- **Dates of grades publication:** Friday, September, 4.
- **Date of exam revision:** Monday, September, 6 at 15 h (the place will be announced in Aula Global).
- **Rules for exam revision:**
  - Its only purpose will be that each student:
    - check the number of correct answers;
    - handout in writing, if (s)he wants, the possible claims about the problem text and the questions, that will be attended by writing in the next 10 days since the revision date.
  - 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 grade publication.

ANSWER Draft														
	A.	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**
1.			**13.**			**25.**			**37.**			**49.**		
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12.			**24.**			**36.**			**48.**			**60.**		

Problem 1

1. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

2. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the enfant's height is independent of the gender is rejected at the 10%, but not at the 5%.

   A. True.

   B. False.

3. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable `EDADM`, the OLS estimator of β_3 will be inconsistent.

   A. True.

   B. False.

4. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables will change in accordance with the correlation of the corresponding variable with the omitted variable `RENTAH`.

   A. True.

   B. False.

5. If household income were measured with error, only the estimators of β_1 and β_5 would be inconsistent.

   A. True.

   B. False.

6. If household income were measured in euros, instead of thousand euros, the R^2 would be unchanged.

   A. True.

   B. False.

7. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. If we consider a model including the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, we would expect the estimated coefficient of `EDUCM` to be even higher than the one obtained in *Output 1*.

   A. True.

   B. False.

8. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of mother's education is independent of the enfant's gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

9. Assume that model (*) satisfies all the assumptions of the classical regression model. The test statistic for the null hypothesis that the enfant's height is independent of the gender is $W^0 \simeq \dfrac{(7715.57 - 7566.77)}{7566.77} \times (269 - 5 - 1)$.

   A. True.

   B. False.

10. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional estimators of the variances of the OLS estimators will be incorrect.

   A. True.

   B. False.

11. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables would not change substantially, since `RENTAH` is not a relevant variable.

   A. True.

   B. False.

12. The model (*) provides the same estimator, for two siblings with different gender, of the impact of a rise in household income on the mean height.

   A. True.

   B. False.

13. Assume that model (*) satisfies all the assumptions of the classical regression model. Using the appropriate estimates, everything else constant, for a 5-year old girl, the mean height difference if she belongs to a household whose income is 11000 euros in comparison with another household whose income is 10000 euros, is approximately 2.51 cm.

   A. True.

   B. False.

14. If household income were measured with error, the inconsistency bias of the estimators of the coefficients affected will be higher the higher the variance of the measurement error, relative to the variance of income.

   A. True.

   B. False.

15. Assuming that the variables `RENTAFEM` and `RENTAH` are strongly correlated, if we estimate model (*) omitting any of them, the numerical value of the F statistic of joint significance would drop substantially.

   A. True.

   B. False.

16. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of household income is independent of the enfant's gender is $H_0 : \beta_5 = 0$.

    A. True.

    B. False.

17. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable EDADM, it holds that $E\left(u \mid \texttt{RENTAH}, \texttt{EDUCM}, \texttt{FEM}\right) = 0$.

    A. True.

    B. False.

18. Given that 1 centimeter is about 0.4 inches, if instead of using height in centimeters, we used height in inches, the coefficients and their standard errors would be rescaled by a factor of 0.4.

    A. True.

    B. False.

19. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional OLS estimators of the model parameters will be incorrect.

    A. True.

    B. False.

20. If household income were measured in euros, instead of thousand euros, the OLS estimators of all the coefficients would become transformed.

    A. True.

    B. False.

21. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. Besides, suppose that, when estimating the model with the variable EDUCP (Father's education), in addition to the variables already included in *Output 1*, the t statistics of EDUCP and EDUCM are, respectively, 0.8 and 0.9. Then, we can assert that father's and mother's education are not relevant for enfant height.

    A. True.

    B. False.

22. Assume that model (*) satisfies all the assumptions of the classical regression model, including conditional homoskedasticity, but we use standard errors robust to heteroskedasticity. Then, inference will be incorrect, because such standard errors are inconsistent under homoskedasticity.

    A. True.

    B. False.

23. Given the coefficients for the variable EDUCM in *Outputs 1* and *2*, if we ran a simple regression of the variable EDUCM on EDADM, the coefficient of EDADM would be positive.

    A. True.

    B. False.

24. To complement the specification of model (*), we should also include the interaction variable `RENTAMAS` = `RENTAH` × `MAS`, where `MAS` is a binary variable which equals 1 if the enfant is a boy and 0 if the enfant is a girl.

    A. True.

    B. False.

25. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = \beta_5 = 0$.

    A. True.

    B. False.

Problem 2

26. According to the information provided, the OLS estimators of Marr and nchild will be biased estimators of β_5 and β_6, and therefore we should calculate their corresponding heteroskedasticity-robust standard errors.

    A. True.

    B. False.

27. Using the appropriate output, and keeping everything else constant, a 20 year-old married mother works, on average, about 5.1 hours per week less than a 40 year-old unmarried mother.

    A. True.

    B. False.

28. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, to have an over-identified equation it is sufficient to have that $C(\texttt{mb1}, \texttt{Marr}) \neq 0$ and $C(\texttt{mb1}, \texttt{nchild}) \neq 0$ simultaneously, or either $C(\texttt{boy1}, \texttt{Marr}) \neq 0$ and $C(\texttt{boy1}, \texttt{nchild}) \neq 0$ simultaneously.

    A. True.

    B. False.

29. Using the appropriate output, we can assert that, other things equal, a 31-year old woman works, on average, about 1.18 hours less per week than a 30-year old woman.

    A. True.

    B. False.

30. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is under–identified, then it should be appropriately estimated by OLS.

    A. True.

    B. False.

31. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 0$.

    A. True.

    B. False.

32. Using the appropriate output, the number of hours worked is increasing with age, for women until the age of 29, whereas for women older than 29, age increases tend to reduce the amount of hours worked.

    A. True.

    B. False.

33. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument per endogenous variable to have an over–identified equation.

    A. True.

    B. False.

34. Using the appropriate output, a married mother, 20 years old, with one child, and with 12 years of education, will work, on average, about 14.1 hours per week.

    A. True.

    B. False.

35. Using the appropriate output, we can assert that an increase in education increases the amount of working hours at a decreasing rate.

    A. True.

    B. False.

36. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4* and `boy1` not significant in *Output 2*.

    A. True.

    B. False.

37. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument to have an over–identified equation.

    A. True.

    B. False.

38. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we could consistently estimate the model using only one of the instruments. Nevertheless, the resulting estimates would be less efficient than the one that would use both instruments.

    A. True.

    B. False.

39. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4*.

    A. True.

    B. False.

40. Using the appropriate output, a married mother, 25 years old, with one child, and with 12 years of education, will work, on average, about 27.4 hours per week.

    A. True.

    B. False.

41. Using the appropriate output, and keeping everything else constant, a 20 year-old unmarried mother works, on average, about 13.9 hours per week more than a 40 year-old married mother.

    A. True.

    B. False.

42. If we estimated the same equation as in *Output 6* by OLS, using `Marr` but substituting `nchild` by its corresponding prediction based on the estimates from *Output 4*, the numerical estimation of β_6 would be the same as in *Output 6*, but the numerical estimation of β_5 would differ from the one in *Output 6*.

A. True.

B. False.

43. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that the hours worked during the week tend to increase with the years of education, but at a decreasing rate. Nevertheless, the number of hours worked does not decrease with any relevant level of education (less than twenty years).

A. True.

B. False.

44. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by 2SLS, but using as instruments the corresponding predictions of `Marr` and `nchild` based on *Output 2* and *Output 4*, respectively.

A. True.

B. False.

45. If we would want to test for the exogeneity of `Marr` only, we should proceed as in *Output 7*, but excluding `u_nchild`, and use the $t-$statistic of `u_Marr` to implement the exogeneity test.

A. True.

B. False.

46. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we will have an exactly identified equation, which can be appropriately estimated by OLS.

A. True.

B. False.

47. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 130.3 and 5884.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

A. True.

B. False.

48. According to the information provided, we can equivalently implement the exogeneity test (with a similar value) of `nchild` and `Marr` using *Output 7* and *Output 1*.

A. True.

B. False.

49. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 2264.0 and 27369.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

A. True.

B. False.

50. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ all parameter estimates from *Output 1* will in general be biased and inconsistent.

   A. True.

   B. False.

51. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ we can say from *Output 1* that a married woman works on average 5.7 hours less per week than an unmarried woman. Nevertheless, nothing can be said about the impact of the number of children, since its estimated coefficient is inconsistent.

   A. True.

   B. False.

52. According to the information provided, we reject the exogeneity of `nchild` and `Marr` at the 5% significance level, given the value 234 of the χ^2 statistic.

   A. True.

   B. False.

53. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that an increase in the age of the mother, increases the hours worked during the last week but a decreasing rate. Nevertheless, it will not reduce the number of hours at any relevant age (less than sixty five years old).

   A. True.

   B. False.

54. In case $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$ but both `Marr` and `nchild` had zero mean and were uncorrelated with all other regressors, which are exogenous, the OLS estimates of β_1, β_2, β_3 and β_4 would be consistent, but not those of β_5 and β_6.

   A. True.

   B. False.

55. Given the information available, we cannot test for the exogeneity of the instruments `mb1` and `boy1`.

   A. True.

   B. False.

56. With the information available, to test that `mb1` is not correlated with u, we would need an additional instrument and perform the usual over-identification test.

   A. True.

   B. False.

57. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 1$.

   A. True.

   B. False.

58. In order to test that `nchild` is not correlated with u, we could eliminate `Marr` from the regression and, since we have two instruments for `nchild`, we could proceed as usual with the over-identification test.

   A. True.

   B. False.

59. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by OLS, but substituting `Marr` and `nchild` by their corresponding predictions based on *Output 2* and *Output 4*, respectively.

   A. True.

   B. False.

60. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, independently on the partial correlation of the instruments with `Marr` and `nchild`, neither OLS nor 2SLS will provide consistent estimators.

   A. True.

   B. False.

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- All the questions correctly answered have the same score. Any incorrect answer will score as zero. To obtain a pass (at least 5 over 10) you must correctly answer **35** questions. In the 2nd call (september), no complementary grades obtained during the course are considered.
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ANSWER Draft														
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Problem 1

1. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of mother's education is independent of the enfant's gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

2. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = \beta_5 = 0$.

   A. True.

   B. False.

3. Assume that model (*) satisfies all the assumptions of the classical regression model. Using the appropriate estimates, everything else constant, for a 5-year old girl, the mean height difference if she belongs to a household whose income is 11000 euros in comparison with another household whose income is 10000 euros, is approximately 2.51 cm.

   A. True.

   B. False.

4. If household income were measured in euros, instead of thousand euros, the R^2 would be unchanged.

   A. True.

   B. False.

5. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the enfant's height is independent of the gender is rejected at the 10%, but not at the 5%.

   A. True.

   B. False.

6. Given the coefficients for the variable `EDUCM` in *Outputs 1* and *2*, if we ran a simple regression of the variable `EDUCM` on `EDADM`, the coefficient of `EDADM` would be positive.

   A. True.

   B. False.

7. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable `EDADM`, the OLS estimator of β_3 will be inconsistent.

   A. True.

   B. False.

8. Assuming that the variables `RENTAFEM` and `RENTAH` are strongly correlated, if we estimate model (*) omitting any of them, the numerical value of the F statistic of joint significance would drop substantially.

   A. True.

   B. False.

9. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables would not change substantially, since `RENTAH` is not a relevant variable.

   A. True.

   B. False.

10. Assume that model (*) satisfies all the assumptions of the classical regression model. The test statistic for the null hypothesis that the enfant's height is independent of the gender is $W^0 \simeq \dfrac{(7715.57 - 7566.77)}{7566.77} \times (269 - 5 - 1)$.

    A. True.

    B. False.

11. Assume that model (*) satisfies all the assumptions of the classical regression model, including conditional homoskedasticity, but we use standard errors robust to heteroskedasticity. Then, inference will be incorrect, because such standard errors are inconsistent under homoskedasticity.

    A. True.

    B. False.

12. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of household income is independent of the enfant's gender is $H_0 : \beta_5 = 0$.

    A. True.

    B. False.

13. If household income were measured with error, the inconsistency bias of the estimators of the coefficients affected will be higher the higher the variance of the measurement error, relative to the variance of income.

    A. True.

    B. False.

14. To complement the specification of model (*), we should also include the interaction variable `RENTAMAS` = `RENTAH` × `MAS`, where `MAS` is a binary variable which equals 1 if the enfant is a boy and 0 if the enfant is a girl.

    A. True.

    B. False.

15. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = 0$.

    A. True.

    B. False.

16. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional OLS estimators of the model parameters will be incorrect.

    A. True.

    B. False.

17. Given that 1 centimeter is about 0.4 inches, if instead of using height in centimeters, we used height in inches, the coefficients and their standard errors would be rescaled by a factor of 0.4.

    A. True.

    B. False.

18. If household income were measured in euros, instead of thousand euros, the OLS estimators of all the coefficients would become transformed.

    A. True.

    B. False.

19. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables will change in accordance with the correlation of the corresponding variable with the omitted variable `RENTAH`.

    A. True.

    B. False.

20. If household income were measured with error, only the estimators of β_1 and β_5 would be inconsistent.

    A. True.

    B. False.

21. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable `EDADM`, it holds that $E\left(u \mid \texttt{RENTAH}, \texttt{EDUCM}, \texttt{FEM}\right) = 0$.

    A. True.

    B. False.

22. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. Besides, suppose that, when estimating the model with the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, the t statistics of `EDUCP` and `EDUCM` are, respectively, 0.8 and 0.9. Then, we can assert that father's and mother's education are not relevant for enfant height.

    A. True.

    B. False.

23. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional estimators of the variances of the OLS estimators will be incorrect.

    A. True.

    B. False.

24. The model (*) provides the same estimator, for two siblings with different gender, of the impact of a rise in household income on the mean height.

   A. True.

   B. False.

25. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. If we consider a model including the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, we would expect the estimated coefficient of `EDUCM` to be even higher than the one obtained in *Output 1*.

   A. True.

   B. False.

Problem 2

26. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, independently on the partial correlation of the instruments with `Marr` and `nchild`, neither OLS nor 2SLS will provide consistent estimators.

    A. True.

    B. False.

27. With the information available, to test that `mb1` is not correlated with u, we would need an additional instrument and perform the usual over-identification test.

    A. True.

    B. False.

28. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument per endogenous variable to have an over–identified equation.

    A. True.

    B. False.

29. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4* and `boy1` not significant in *Output 2*.

    A. True.

    B. False.

30. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we could consistently estimate the model using only one of the instruments. Nevertheless, the resulting estimates would be less efficient than the one that would use both instruments.

    A. True.

    B. False.

31. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by 2SLS, but using as instruments the corresponding predictions of `Marr` and `nchild` based on *Output 2* and *Output 4*, respectively.

    A. True.

    B. False.

32. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 130.3 and 5884.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

    A. True.

    B. False.

33. In case $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$ but both `Marr` and `nchild` had zero mean and were uncorrelated with all other regressors, which are exogenous, the OLS estimates of β_1, β_2, β_3 and β_4 would be consistent, but not those of β_5 and β_6.

    A. True.

    B. False.

34. Using the appropriate output, a married mother, 25 years old, with one child, and with 12 years of education, will work, on average, about 27.4 hours per week.

A. True.

B. False.

35. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that an increase in the age of the mother, increases the hours worked during the last week but a decreasing rate. Nevertheless, it will not reduce the number of hours at any relevant age (less than sixty five years old).

A. True.

B. False.

36. Using the appropriate output, the number of hours worked is increasing with age, for women until the age of 29, whereas for women older than 29, age increases tend to reduce the amount of hours worked.

A. True.

B. False.

37. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4*.

A. True.

B. False.

38. If we would want to test for the exogeneity of `Marr` only, we should proceed as in *Output 7*, but excluding `u_nchild`, and use the $t-$statistic of `u_Marr` to implement the exogeneity test.

A. True.

B. False.

39. If we estimated the same equation as in *Output 6* by OLS, using `Marr` but substituting `nchild` by its corresponding prediction based on the estimates from *Output 4*, the numerical estimation of β_6 would be the same as in *Output 6*, but the numerical estimation of β_5 would differ from the one in *Output 6*.

A. True.

B. False.

40. Using the appropriate output, a married mother, 20 years old, with one child, and with 12 years of education, will work, on average, about 14.1 hours per week.

A. True.

B. False.

41. Using the appropriate output, we can assert that, other things equal, a 31-year old woman works, on average, about 1.18 hours less per week than a 30-year old woman.

A. True.

B. False.

42. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, to have an over-identified equation it is sufficient to have that $C(\texttt{mb1}, \texttt{Marr}) \neq 0$ and $C(\texttt{mb1}, \texttt{nchild}) \neq 0$ simultaneously, or either $C(\texttt{boy1}, \texttt{Marr}) \neq 0$ and $C(\texttt{boy1}, \texttt{nchild}) \neq 0$ simultaneously.

A. True.

B. False.

43. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 2264.0 and 27369.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

A. True.

B. False.

44. Given the information available, we cannot test for the exogeneity of the instruments `mb1` and `boy1`.

A. True.

B. False.

45. According to the information provided, the OLS estimators of `Marr` and `nchild` will be biased estimators of β_5 and β_6, and therefore we should calculate their corresponding heteroskedasticity-robust standard errors.

A. True.

B. False.

46. According to the information provided, we can equivalently implement the exogeneity test (with a similar value) of `nchild` and `Marr` using *Output 7* and *Output 1*.

A. True.

B. False.

47. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that the hours worked during the week tend to increase with the years of education, but at a decreasing rate. Nevertheless, the number of hours worked does not decrease with any relevant level of education (less than twenty years).

A. True.

B. False.

48. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by OLS, but substituting `Marr` and `nchild` by their corresponding predictions based on *Output 2* and *Output 4*, respectively.

A. True.

B. False.

49. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ we can say from *Output 1* that a married woman works on average 5.7 hours less per week than an unmarried woman. Nevertheless, nothing can be said about the impact of the number of children, since its estimated coefficient is inconsistent.

A. True.

B. False.

50. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we will have an exactly identified equation, which can be appropriately estimated by OLS.

   A. True.

   B. False.

51. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 1$.

   A. True.

   B. False.

52. Using the appropriate output, and keeping everything else constant, a 20 year-old unmarried mother works, on average, about 13.9 hours per week more than a 40 year-old married mother.

   A. True.

   B. False.

53. According to the information provided, we reject the exogeneity of `nchild` and `Marr` at the 5% significance level, given the value 234 of the χ^2 statistic.

   A. True.

   B. False.

54. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is under–identified, then it should be appropriately estimated by OLS.

   A. True.

   B. False.

55. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 0$.

   A. True.

   B. False.

56. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ all parameter estimates from *Output 1* will in general be biased and inconsistent.

   A. True.

   B. False.

57. Using the appropriate output, and keeping everything else constant, a 20 year-old married mother works, on average, about 5.1 hours per week less than a 40 year-old unmarried mother.

   A. True.

   B. False.

58. Using the appropriate output, we can assert that an increase in education increases the amount of working hours at a decreasing rate.

   A. True.

   B. False.

59. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument to have an over–identified equation.

A. True.

B. False.

60. In order to test that `nchild` is not correlated with u, we could eliminate `Marr` from the regression and, since we have two instruments for `nchild`, we could proceed as usual with the over-identification test.

A. True.

B. False.

Universidad Carlos III de Madrid
<u>ECONOMETRICS I</u>
Academic year 2008/09
FINAL EXAM (2nd call)
September, 1, 2009

Exam type: 3

TIME: 2 HOURS 30 MINUTES
Directions:

- BEFORE YOU START TO ANSWER THE EXAM:
  - Fill in your personal data in the optical reading form, which will be the only valid answering document. Remember that you must complete all your identifiying data (name and surname(s), and **NIU**, which has 9 digit 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).
- **Check that this document contains 60 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 problem text and the questions carefully.
  The first 25 questions are referred to Problem 1, and the remaining questions correspond to Problem 2
- For each row regarding the number of each question, fill the box which corresponds with your chosen option in the optical reading form (A, B, C or D).
- **Each question only has one correct answer.**
  Any question in which more than one answer is selected will be considered incorrect and its score will be zero.
- All the questions correctly answered have the same score. Any incorrect answer will score as zero. To obtain a pass (at least 5 over 10) you must correctly answer **35** questions. In the 2nd call (september), no complementary grades obtained during the course are considered.
- 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).
- **Any student who were found talking or sharing any sort of material during the exam will be expelled out inmediately and his/her overall score will be zero, independently of any other measure that could be undertaken.**

- **Dates of grades publication:** Friday, September, 4.
- **Date of exam revision:** Monday, September, 6 at 15 h (the place will be announced in Aula Global).
- **Rules for exam revision:**
  - Its only purpose will be that each student:
    - check the number of correct answers;
    - handout in writing, if (s)he wants, the possible claims about the problem text and the questions, that will be attended by writing in the next 10 days since the revision date.
  - 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 grade publication.

ANSWER Draft														
	A.	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**
1.			**13.**			**25.**			**37.**			**49.**		
2.			**14.**			**26.**			**38.**			**50.**		
3.			**15.**			**27.**			**39.**			**51.**		
4.			**16.**			**28.**			**40.**			**52.**		
5.			**17.**			**29.**			**41.**			**53.**		
6.			**18.**			**30.**			**42.**			**54.**		
7.			**19.**			**31.**			**43.**			**55.**		
8.			**20.**			**32.**			**44.**			**56.**		
9.			**21.**			**33.**			**45.**			**57.**		
10.			**22.**			**34.**			**46.**			**58.**		
11.			**23.**			**35.**			**47.**			**59.**		
12.			**24.**			**36.**			**48.**			**60.**		

Problem 1

1. Assume that model (*) satisfies all the assumptions of the classical regression model, including conditional homoskedasticity, but we use standard errors robust to heteroskedasticity. Then, inference will be incorrect, because such standard errors are inconsistent under homoskedasticity.

   A. True.

   B. False.

2. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of mother's education is independent of the enfant's gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

3. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables will change in accordance with the correlation of the corresponding variable with the omitted variable `RENTAH`.

   A. True.

   B. False.

4. The model (*) provides the same estimator, for two siblings with different gender, of the impact of a rise in household income on the mean height.

   A. True.

   B. False.

5. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable `EDADM`, the OLS estimator of β_3 will be inconsistent.

   A. True.

   B. False.

6. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the enfant's height is independent of the gender is rejected at the 10%, but not at the 5%.

   A. True.

   B. False.

7. Assume that model (*) satisfies all the assumptions of the classical regression model. The test statistic for the null hypothesis that the enfant's height is independent of the gender is $W^0 \simeq \frac{(7715.57 - 7566.77)}{7566.77} \times (269 - 5 - 1)$.

   A. True.

   B. False.

8. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. Besides, suppose that, when estimating the model with the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, the t statistics of `EDUCP` and `EDUCM` are, respectively, 0.8 and 0.9. Then, we can assert that father's and mother's education are not relevant for enfant height.

   A. True.

   B. False.

9. Given that 1 centimeter is about 0.4 inches, if instead of using height in centimeters, we used height in inches, the coefficients and their standard errors would be rescaled by a factor of 0.4.

   A. True.

   B. False.

10. If household income were measured in euros, instead of thousand euros, the R^2 would be unchanged.

    A. True.

    B. False.

11. If household income were measured in euros, instead of thousand euros, the OLS estimators of all the coefficients would become transformed.

    A. True.

    B. False.

12. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of household income is independent of the enfant's gender is $H_0 : \beta_5 = 0$.

    A. True.

    B. False.

13. If household income were measured with error, the inconsistency bias of the estimators of the coefficients affected will be higher the higher the variance of the measurement error, relative to the variance of income.

    A. True.

    B. False.

14. To complement the specification of model (*), we should also include the interaction variable `RENTAMAS` = `RENTAH` $\times$ `MAS`, where `MAS` is a binary variable which equals 1 if the enfant is a boy and 0 if the enfant is a girl.

    A. True.

    B. False.

15. Assume that model (*) satisfies all the assumptions of the classical regression model. Using the appropriate estimates, everything else constant, for a 5-year old girl, the mean height difference if she belongs to a household whose income is 11000 euros in comparison with another household whose income is 10000 euros, is approximately 2.51 cm.

    A. True.

    B. False.

16. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional OLS estimators of the model parameters will be incorrect.

    A. True.

    B. False.

17. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional estimators of the variances of the OLS estimators will be incorrect.

    A. True.

    B. False.

18. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = 0$.

    A. True.

    B. False.

19. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. If we consider a model including the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, we would expect the estimated coefficient of `EDUCM` to be even higher than the one obtained in *Output 1*.

    A. True.

    B. False.

20. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables would not change substantially, since `RENTAH` is not a relevant variable.

    A. True.

    B. False.

21. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = \beta_5 = 0$.

    A. True.

    B. False.

22. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable EDADM, it holds that $E\left(u \mid \texttt{RENTAH}, \texttt{EDUCM}, \texttt{FEM}\right) = 0$.

A. True.

B. False.

23. Assuming that the variables RENTAFEM and RENTAH are strongly correlated, if we estimate model (*) omitting any of them, the numerical value of the F statistic of joint significance would drop substantially.

A. True.

B. False.

24. Given the coefficients for the variable EDUCM in *Outputs 1* and *2*, if we ran a simple regression of the variable EDUCM on EDADM, the coefficient of EDADM would be positive.

A. True.

B. False.

25. If household income were measured with error, only the estimators of β_1 and β_5 would be inconsistent.

A. True.

B. False.

Problem 2

26. Using the appropriate output, a married mother, 25 years old, with one child, and with 12 years of education, will work, on average, about 27.4 hours per week.

    A. True.

    B. False.

27. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 2264.0 and 27369.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

    A. True.

    B. False.

28. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, to have an over-identified equation it is sufficient to have that $C(\texttt{mb1}, \texttt{Marr}) \neq 0$ and $C(\texttt{mb1}, \texttt{nchild}) \neq 0$ simultaneously, or either $C(\texttt{boy1}, \texttt{Marr}) \neq 0$ and $C(\texttt{boy1}, \texttt{nchild}) \neq 0$ simultaneously.

    A. True.

    B. False.

29. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument to have an over–identified equation.

    A. True.

    B. False.

30. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4* and `boy1` not significant in *Output 2*.

    A. True.

    B. False.

31. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 130.3 and 5884.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

    A. True.

    B. False.

32. If we would want to test for the exogeneity of `Marr` only, we should proceed as in *Output 7*, but excluding `u_nchild`, and use the $t-$statistic of `u_Marr` to implement the exogeneity test.

    A. True.

    B. False.

33. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ we can say from *Output 1* that a married woman works on average 5.7 hours less per week than an unmarried woman. Nevertheless, nothing can be said about the impact of the number of children, since its estimated coefficient is inconsistent.

    A. True.

    B. False.

34. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we could consistently estimate the model using only one of the instruments. Nevertheless, the resulting estimates would be less efficient than the one that would use both instruments.

A. True.

B. False.

35. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we will have an exactly identified equation, which can be appropriately estimated by OLS.

A. True.

B. False.

36. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by OLS, but substituting `Marr` and `nchild` by their corresponding predictions based on *Output 2* and *Output 4*, respectively.

A. True.

B. False.

37. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 0$.

A. True.

B. False.

38. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that an increase in the age of the mother, increases the hours worked during the last week but a decreasing rate. Nevertheless, it will not reduce the number of hours at any relevant age (less than sixty five years old).

A. True.

B. False.

39. Given the information available, we cannot test for the exogeneity of the instruments `mb1` and `boy1`.

A. True.

B. False.

40. Using the appropriate output, a married mother, 20 years old, with one child, and with 12 years of education, will work, on average, about 14.1 hours per week.

A. True.

B. False.

41. In case $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$ but both `Marr` and `nchild` had zero mean and were uncorrelated with all other regressors, which are exogenous, the OLS estimates of β_1, β_2, β_3 and β_4 would be consistent, but not those of β_5 and β_6.

A. True.

B. False.

42. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, independently on the partial correlation of the instruments with `Marr` and `nchild`, neither OLS nor 2SLS will provide consistent estimators.

   A. True.

   B. False.

43. Using the appropriate output, we can assert that an increase in education increases the amount of working hours at a decreasing rate.

   A. True.

   B. False.

44. According to the information provided, the OLS estimators of `Marr` and `nchild` will be biased estimators of β_5 and β_6, and therefore we should calculate their corresponding heteroskedasticity-robust standard errors.

   A. True.

   B. False.

45. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by 2SLS, but using as instruments the corresponding predictions of `Marr` and `nchild` based on *Output 2* and *Output 4*, respectively.

   A. True.

   B. False.

46. In order to test that `nchild` is not correlated with u, we could eliminate `Marr` from the regression and, since we have two instruments for `nchild`, we could proceed as usual with the over-identification test.

   A. True.

   B. False.

47. Using the appropriate output, we can assert that, other things equal, a 31-year old woman works, on average, about 1.18 hours less per week than a 30-year old woman.

   A. True.

   B. False.

48. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument per endogenous variable to have an over–identified equation.

   A. True.

   B. False.

49. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ all parameter estimates from *Output 1* will in general be biased and inconsistent.

   A. True.

   B. False.

50. Using the appropriate output, the number of hours worked is increasing with age, for women until the age of 29, whereas for women older than 29, age increases tend to reduce the amount of hours worked.

A. True.

B. False.

51. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4*.

A. True.

B. False.

52. With the information available, to test that `mb1` is not correlated with u, we would need an additional instrument and perform the usual over-identification test.

A. True.

B. False.

53. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that the hours worked during the week tend to increase with the years of education, but at a decreasing rate. Nevertheless, the number of hours worked does not decrease with any relevant level of education (less than twenty years).

A. True.

B. False.

54. According to the information provided, we can equivalently implement the exogeneity test (with a similar value) of `nchild` and `Marr` using *Output 7* and *Output 1*.

A. True.

B. False.

55. If we estimated the same equation as in *Output 6* by OLS, using `Marr` but substituting `nchild` by its corresponding prediction based on the estimates from *Output 4*, the numerical estimation of β_6 would be the same as in *Output 6*, but the numerical estimation of β_5 would differ from the one in *Output 6*.

A. True.

B. False.

56. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is under–identified, then it should be appropriately estimated by OLS.

A. True.

B. False.

57. Using the appropriate output, and keeping everything else constant, a 20 year-old unmarried mother works, on average, about 13.9 hours per week more than a 40 year-old married mother.

A. True.

B. False.

58. According to the information provided, we reject the exogeneity of `nchild` and `Marr` at the 5% significance level, given the value 234 of the χ^2 statistic.

A. True.

B. False.

59. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 1$.

A. True.

B. False.

60. Using the appropriate output, and keeping everything else constant, a 20 year-old married mother works, on average, about 5.1 hours per week less than a 40 year-old unmarried mother.

A. True.

B. False.

Universidad Carlos III de Madrid
ECONOMETRICS I
Academic year 2008/09
FINAL EXAM (2nd call)
September, 1, 2009

Exam type: 4

TIME: 2 HOURS 30 MINUTES
Directions:

- BEFORE YOU START TO ANSWER THE EXAM:
  - Fill in your personal data in the optical reading form, which will be the only valid answering document. Remember that you must complete all your identifiying data (name and surname(s), and **NIU**, which has 9 digit 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).
- **Check that this document contains 60 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 problem text and the questions carefully.
  The first 25 questions are referred to Problem 1, and the remaining questions correspond to Problem 2
- For each row regarding the number of each question, fill the box which corresponds with your chosen option in the optical reading form (A, B, C or D).
- **Each question only has one correct answer.**
  Any question in which more than one answer is selected will be considered incorrect and its score will be zero.
- All the questions correctly answered have the same score. Any incorrect answer will score as zero. To obtain a pass (at least 5 over 10) you must correctly answer **35** questions. In the 2nd call (september), no complementary grades obtained during the course are considered.
- 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).
- **Any student who were found talking or sharing any sort of material during the exam will be expelled out inmediately and his/her overall score will be zero, independently of any other measure that could be undertaken.**

- **Dates of grades publication:** Friday, September, 4.
- **Date of exam revision:** Monday, September, 6 at 15 h (the place will be announced in Aula Global).
- **Rules for exam revision:**
  - Its only purpose will be that each student:
    - check the number of correct answers;
    - handout in writing, if (s)he wants, the possible claims about the problem text and the questions, that will be attended by writing in the next 10 days since the revision date.
  - 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 grade publication.

ANSWER Draft														
	A.	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**		**A.**	**B.**
1.			**13.**			**25.**			**37.**			**49.**		
2.			**14.**			**26.**			**38.**			**50.**		
3.			**15.**			**27.**			**39.**			**51.**		
4.			**16.**			**28.**			**40.**			**52.**		
5.			**17.**			**29.**			**41.**			**53.**		
6.			**18.**			**30.**			**42.**			**54.**		
7.			**19.**			**31.**			**43.**			**55.**		
8.			**20.**			**32.**			**44.**			**56.**		
9.			**21.**			**33.**			**45.**			**57.**		
10.			**22.**			**34.**			**46.**			**58.**		
11.			**23.**			**35.**			**47.**			**59.**		
12.			**24.**			**36.**			**48.**			**60.**		

Problem 1

1. Given the coefficients for the variable EDUCM in *Outputs 1* and *2*, if we ran a simple regression of the variable EDUCM on EDADM, the coefficient of EDADM would be positive.

   A. True.

   B. False.

2. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional OLS estimators of the model parameters will be incorrect.

   A. True.

   B. False.

3. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable EDADM, the OLS estimator of β_3 will be inconsistent.

   A. True.

   B. False.

4. Assume that model (*) satisfies all the assumptions of the classical regression model, except conditional homoskedasticity. Then, the conventional estimators of the variances of the OLS estimators will be incorrect.

   A. True.

   B. False.

5. Assuming that the variables RENTAFEM and RENTAH are strongly correlated, if we estimate model (*) omitting any of them, the numerical value of the F statistic of joint significance would drop substantially.

   A. True.

   B. False.

6. Assume that model (*) satisfies all the assumptions of the classical regression model. The test statistic for the null hypothesis that the enfant's height is independent of the gender is $W^0 \simeq \dfrac{(7715.57 - 7566.77)}{7566.77} \times (269 - 5 - 1)$.

   A. True.

   B. False.

7. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = \beta_5 = 0$.

   A. True.

   B. False.

8. If household income were measured in euros, instead of thousand euros, the OLS estimators of all the coefficients would become transformed.

   A. True.

   B. False.

9. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of household income is independent of the enfant's gender is $H_0 : \beta_5 = 0$.

   A. True.

   B. False.

10. To complement the specification of model (*), we should also include the interaction variable `RENTAMAS` = `RENTAH` × `MAS`, where `MAS` is a binary variable which equals 1 if the enfant is a boy and 0 if the enfant is a girl.

   A. True.

   B. False.

11. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables would not change substantially, since `RENTAH` is not a relevant variable.

   A. True.

   B. False.

12. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that in households with the same income the enfant's height is independent of the gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

13. Given that 1 centimeter is about 0.4 inches, if instead of using height in centimeters, we used height in inches, the coefficients and their standard errors would be rescaled by a factor of 0.4.

   A. True.

   B. False.

14. If household income were measured with error, only the estimators of β_1 and β_5 would be inconsistent.

   A. True.

   B. False.

15. If household income were measured in euros, instead of thousand euros, the R^2 would be unchanged.

   A. True.

   B. False.

16. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the enfant's height is independent of the gender is rejected at the 10%, but not at the 5%.

   A. True.

   B. False.

17. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. If we consider a model including the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, we would expect the estimated coefficient of `EDUCM` to be even higher than the one obtained in *Output 1*.

    A. True.

    B. False.

18. If household income were measured with error, the inconsistency bias of the estimators of the coefficients affected will be higher the higher the variance of the measurement error, relative to the variance of income.

    A. True.

    B. False.

19. It could be argued that model (*) omits father's education. Assume that both father's and mother's education have a positive effect on enfants' height, and that spouses tend to exhibit similar education levels. Besides, suppose that, when estimating the model with the variable `EDUCP` (Father's education), in addition to the variables already included in *Output 1*, the t statistics of `EDUCP` and `EDUCM` are, respectively, 0.8 and 0.9. Then, we can assert that father's and mother's education are not relevant for enfant height.

    A. True.

    B. False.

20. Assume that model (*) satisfies all the assumptions of the classical regression model. If we estimate model (*) without the variable `EDADM`, it holds that $E\left(u \mid \texttt{RENTAH}, \texttt{EDUCM}, \texttt{FEM}\right) = 0$.

    A. True.

    B. False.

21. Assume that model (*) satisfies all the assumptions of the classical regression model. Using the appropriate estimates, everything else constant, for a 5-year old girl, the mean height difference if she belongs to a household whose income is 11000 euros in comparison with another household whose income is 10000 euros, is approximately 2.51 cm.

    A. True.

    B. False.

22. The model (*) provides the same estimator, for two siblings with different gender, of the impact of a rise in household income on the mean height.

    A. True.

    B. False.

23. Assume that model (*) satisfies all the assumptions of the classical regression model, including conditional homoskedasticity, but we use standard errors robust to heteroskedasticity. Then, inference will be incorrect, because such standard errors are inconsistent under homoskedasticity.

    A. True.

    B. False.

24. Assume that model (*) satisfies all the assumptions of the classical regression model. If we exclude the variable `RENTAH` from model (*), the estimated values of the coefficients of the included variables will change in accordance with the correlation of the corresponding variable with the omitted variable `RENTAH`.

   A. True.

   B. False.

25. Assume that model (*) satisfies all the assumptions of the classical regression model. The null hypothesis that the effect of mother's education is independent of the enfant's gender is $H_0 : \beta_4 = 0$.

   A. True.

   B. False.

Problem 2

26. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument to have an over–identified equation.

    A. True.

    B. False.

27. In case $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$ but both `Marr` and `nchild` had zero mean and were uncorrelated with all other regressors, which are exogenous, the OLS estimates of β_1, β_2, β_3 and β_4 would be consistent, but not those of β_5 and β_6.

    A. True.

    B. False.

28. Using the appropriate output, we can assert that, other things equal, a 31-year old woman works, on average, about 1.18 hours less per week than a 30-year old woman.

    A. True.

    B. False.

29. Using the appropriate output, and keeping everything else constant, a 20 year-old unmarried mother works, on average, about 13.9 hours per week more than a 40 year-old married mother.

    A. True.

    B. False.

30. Using the appropriate output, a married mother, 20 years old, with one child, and with 12 years of education, will work, on average, about 14.1 hours per week.

    A. True.

    B. False.

31. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4*.

    A. True.

    B. False.

32. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is under–identified, then it should be appropriately estimated by OLS.

    A. True.

    B. False.

33. Using the appropriate output, the number of hours worked is increasing with age, for women until the age of 29, whereas for women older than 29, age increases tend to reduce the amount of hours worked.

    A. True.

    B. False.

34. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that the hours worked during the week tend to increase with the years of education, but at a decreasing rate. Nevertheless, the number of hours worked does not decrease with any relevant level of education (less than twenty years).

A. True.

B. False.

35. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, we will require an additional instrument per endogenous variable to have an over–identified equation.

A. True.

B. False.

36. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ all parameter estimates from *Output 1* will in general be biased and inconsistent.

A. True.

B. False.

37. Using the appropriate output, a married mother, 25 years old, with one child, and with 12 years of education, will work, on average, about 27.4 hours per week.

A. True.

B. False.

38. According to the information provided, we reject the exogeneity of `nchild` and `Marr` at the 5% significance level, given the value 234 of the χ^2 statistic.

A. True.

B. False.

39. Given the information available, we cannot test for the exogeneity of the instruments `mb1` and `boy1`.

A. True.

B. False.

40. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 0$.

A. True.

B. False.

41. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, to have an over-identified equation it is sufficient to have that $C(\texttt{mb1}, \texttt{Marr}) \neq 0$ and $C(\texttt{mb1}, \texttt{nchild}) \neq 0$ simultaneously, or either $C(\texttt{boy1}, \texttt{Marr}) \neq 0$ and $C(\texttt{boy1}, \texttt{nchild}) \neq 0$ simultaneously.

A. True.

B. False.

42. In order to test that `nchild` is not correlated with u, we could eliminate `Marr` from the regression and, since we have two instruments for `nchild`, we could proceed as usual with the over-identification test.

    A. True.

    B. False.

43. In case $C(\texttt{Marr}, u) = C(\texttt{nchild}, u) = 0$, we could say that an increase in the age of the mother, increases the hours worked during the last week but a decreasing rate. Nevertheless, it will not reduce the number of hours at any relevant age (less than sixty five years old).

    A. True.

    B. False.

44. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by 2SLS, but using as instruments the corresponding predictions of `Marr` and `nchild` based on *Output 2* and *Output 4*, respectively.

    A. True.

    B. False.

45. According to the information provided, the OLS estimators of `Marr` and `nchild` will be biased estimators of β_5 and β_6, and therefore we should calculate their corresponding heteroskedasticity-robust standard errors.

    A. True.

    B. False.

46. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 130.3 and 5884.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

    A. True.

    B. False.

47. The null hypothesis that the model is linear in mother's years of education and mother's age is $H_0 : \beta_2 = \beta_4 = 1$.

    A. True.

    B. False.

48. If we estimated the same equation as in *Output 6* by OLS, using `Marr` but substituting `nchild` by its corresponding prediction based on the estimates from *Output 4*, the numerical estimation of β_6 would be the same as in *Output 6*, but the numerical estimation of β_5 would differ from the one in *Output 6*.

    A. True.

    B. False.

49. According to the information provided, we can equivalently implement the exogeneity test (with a similar value) of `nchild` and `Marr` using *Output 7* and *Output 1*.

    A. True.

    B. False.

50. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we will have an exactly identified equation, which can be appropriately estimated by OLS.

A. True.

B. False.

51. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, the equation is identified, everything equal, even if `mb1` were not significant in *Output 4* and `boy1` not significant in *Output 2*.

A. True.

B. False.

52. The same 2SLS estimates of the coefficients in *Output 6* could also be obtained estimating the same equation by OLS, but substituting `Marr` and `nchild` by their corresponding predictions based on *Output 2* and *Output 4*, respectively.

A. True.

B. False.

53. Using the appropriate output, and keeping everything else constant, a 20 year-old married mother works, on average, about 5.1 hours per week less than a 40 year-old unmarried mother.

A. True.

B. False.

54. If we would want to test for the exogeneity of `Marr` only, we should proceed as in *Output 7*, but excluding `u_nchild`, and use the $t-$statistic of `u_Marr` to implement the exogeneity test.

A. True.

B. False.

55. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = C(\texttt{Marr}, u) = 0$ and $C(\texttt{nchild}, u) \neq 0$, we could consistently estimate the model using only one of the instruments. Nevertheless, the resulting estimates would be less efficient than the one that would use both instruments.

A. True.

B. False.

56. In case $C(\texttt{Marr}, u) = 0$ but $C(\texttt{nchild}, u) \neq 0$ we can say from *Output 1* that a married woman works on average 5.7 hours less per week than an unmarried woman. Nevertheless, nothing can be said about the impact of the number of children, since its estimated coefficient is inconsistent.

A. True.

B. False.

57. Using the appropriate output, we can assert that an increase in education increases the amount of working hours at a decreasing rate.

A. True.

B. False.

58. With the information available, to test that `mb1` is not correlated with u, we would need an additional instrument and perform the usual over-identification test.

A. True.

B. False.

59. In case $C(\texttt{mb1}, u) = C(\texttt{boy1}, u) = 0$, from *Output 2* to *Output 5*, we conclude from the corresponding statistics values, which are approximately 2264.0 and 27369.6, and at the 5% significance level, that `mb1` and `boy1` are valid instruments.

A. True.

B. False.

60. In case $C(\texttt{mb1}, u) = 0$, $C(\texttt{boy1}, u) \neq 0$, $C(\texttt{Marr}, u) \neq 0$ and $C(\texttt{nchild}, u) \neq 0$, independently on the partial correlation of the instruments with `Marr` and `nchild`, neither OLS nor 2SLS will provide consistent estimators.

A. True.

B. False.