

**ECON742 Fall 2010**  
**Mid-term exam October 21st 2010**

The exam last for 90 minutes. Manage your time according to the percentages of each question. You are not allowed any document. Good luck!

1. (15%) Consider the following equations.

(a)  $y_t = \beta_1 + \beta_2 x_t + \epsilon_t$

(b)  $y_t = \hat{\beta}_1 + \hat{\beta}_2 x_t + \hat{\epsilon}_t$

(c)  $\hat{y}_t = \hat{\beta}_1 + \hat{\beta}_2 x_t$

(d)  $y_t = \hat{\beta}_1 + \hat{\beta}_2 x_t + \epsilon_t$

(e)  $y_t = \beta_1 + \beta_2 x_t$

(f)  $y_t = \beta_1 + \beta_2 x_t + \hat{\epsilon}_t$

(g)  $\sum_t \epsilon_t = 0$

(h)  $\sum_t x_t \epsilon_t = 0$

Which equations are correct or incorrect? Correct (g) and (h) if need be. A graph would be useful to answer the questions.

2. (50%) Short questions:

- (a) (10%) Recall the assumptions under which OLS works (explain what “works” means). Do we need A5N? Why do we need this assumption then?
- (b) (10%) What is the problem of “omitted variable bias”? Describe it thanks to an equation. Give an exemple in practice.
- (c) (10%) What is the problem of “simultaneity”? Describe it thanks to an equation. Give an exemple in practice.
- (d) (10%) In the presence of heterogeneous effects, and in a randomized experiment, is the estimator still consistent?
- (e) (10%) Explain the fundamental problem of evaluation. Explain it with an equation.

3. (35%) Miguel, Edward and Michael Kremer, “Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities”, *Econometrica*, Vol. 72, No. 1 (January, 2004), 159–217.

What are the two major problems faced by the existing literature when evaluating deworming treatment randomized within a school (i.e. at the level of individuals)? What is the advantage of treating random schools, and not random individuals? Describe quickly how the interventions are organized (how many schools? When are they treated? Who is being treated in the schools?). Look at the attached table VI.

- (a) Can we compare the porportion of infections in 1999 ("any moderate heavy infection, 1999") between group 1 treated and group 1 untreated?
- (b) What does the same comparison between group 1 treated and group 1 untreated for "any moderate heavy infection, 1998" tell us? What about other variables in the panel A? Are these groups comparable? Can we now answer the question a)?
- (c) What does column (5) tell us: "any moderate heavy infection, 1999" for group 1 treated - group 2 treated? Is the group 2 treated in 1999? So what does this result tell us?
- (d) What does column (6) tell us: "any moderate heavy infection, 1999" for group 1 untreated - group 2 untreated? What does this result tell us in terms of externalities?
- (e) In the following table VII, what do you think of the exogeneity of the explanatory variables 2 and 3: ("Group 1 Pupils Within 3km" and "Group 1 Pupils Within 3-6 km")? What about explanatory variables 4 and 5 ("Total Pupils Within 3km" and "Total Pupils Within 3-6 km")? Can we thus interpret the coefficients of explanatory variables 2, 3, 4, 5?
- (f) Interpret the results of Column (1).

TABLE VI  
DEWORMING HEALTH EXTERNALITIES WITHIN SCHOOLS, JANUARY TO MARCH 1999<sup>a</sup>

	Group 1, Treated in 1998	Group 1, Untreated in 1998	Group 2, Treated in 1999	Group 2, Untreated in 1999	(Group 1, Treated 1998) – (Group 2, Treated 1999)	(Group 1, Untreated 1998) – (Group 2, Untreated 1999)
<i>Panel A: Selection into Treatment</i>						
Any moderate-heavy infection, 1998	0.39	0.44	–	–	–	–
Proportion of 1998 parasitological sample tracked to 1999 sample <sup>b</sup>	0.36	0.36	–	–	–	–
Access to latrine at home, 1998	0.84	0.80	0.81	0.86	0.03 (0.04)	–0.06 (0.05)
Grade progression (= Grade – (Age – 6)), 1998	–2.0	–1.8	–1.8	–1.8	–0.2** (0.1)	–0.0 (0.2)
Weight-for-age (Z-score), 1998 (low scores denote undernutrition)	–1.58	–1.52	–1.57	–1.46	–0.01 (0.06)	–0.06 (0.11)
Malaria/fever in past week (self-reported), 1998	0.37	0.41	0.40	0.39	–0.03 (0.04)	–0.01 (0.06)
Clean (observed by field worker), 1998	0.53	0.59	0.60	0.66	–0.07 (0.05)	–0.07 (0.10)
<i>Panel B: Health Outcomes</i>						
<i>Girls &lt;13 years, and all boys</i>						
Any moderate-heavy infection, 1999	0.24	0.34	0.51	0.55	–0.27*** (0.06)	–0.21** (0.10)
Hookworm moderate-heavy infection, 1999	0.04	0.11	0.22	0.20	–0.19*** (0.03)	–0.09* (0.05)
Roundworm moderate-heavy infection, 1999	0.08	0.12	0.22	0.30	–0.14*** (0.04)	–0.18** (0.07)
Schistosomiasis moderate-heavy infection, 1999	0.09	0.08	0.20	0.13	–0.11* (0.06)	–0.05 (0.06)
Whipworm moderate-heavy infection, 1999	0.12	0.16	0.16	0.20	–0.04 (0.16)	–0.05 (0.09)
<i>Girls ≥13 years</i>						
Any moderate-heavy infection, 1998	0.31	0.28	–	–	–	–
Any moderate-heavy infection, 1999	0.27	0.43	0.32	0.54	–0.05 (0.17)	–0.10 (0.09)
<i>Panel C: School Participation</i>						
School participation rate, May 1998 to March 1999 <sup>c</sup>	0.872	0.764	0.808	0.684	0.064** (0.032)	0.080** (0.039)

TABLE VII  
DEWORMING HEALTH EXTERNALITIES WITHIN AND ACROSS SCHOOLS, JANUARY TO MARCH 1999<sup>a</sup>

	Any moderate-heavy helminth infection, 1999			Moderate-heavy schistosomiasis infection, 1999			Moderate-heavy geohelminth infection, 1999		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Indicator for Group 1 (1998 Treatment) School	-0.25*** (0.05)	-0.12* (0.07)	-0.09 (0.11)	-0.03 (0.03)	-0.02 (0.04)	-0.07 (0.06)	-0.20*** (0.04)	-0.11** (0.05)	-0.03 (0.09)
Group 1 pupils within 3 km (per 1000 pupils)	-0.26*** (0.09)	-0.26*** (0.09)	-0.11 (0.13)	-0.12*** (0.04)	-0.12*** (0.04)	-0.11** (0.05)	-0.12* (0.06)	-0.12* (0.07)	-0.01 (0.07)
Group 1 pupils within 3-6 km (per 1000 pupils)	-0.14** (0.06)	-0.13** (0.06)	-0.07 (0.14)	-0.18*** (0.03)	-0.18*** (0.03)	-0.27*** (0.06)	0.04 (0.06)	0.04 (0.06)	0.16 (0.10)
Total pupils within 3 km (per 1000 pupils)	0.11*** (0.04)	0.11*** (0.04)	0.10** (0.04)	0.11*** (0.02)	0.11*** (0.02)	0.13*** (0.02)	0.03 (0.03)	0.04 (0.03)	0.02 (0.03)
Total pupils within 3-6 km (per 1000 pupils)	0.13** (0.06)	0.13** (0.06)	0.12* (0.07)	0.12** (0.03)	0.12*** (0.03)	0.16*** (0.03)	0.04 (0.04)	0.04 (0.04)	0.01 (0.04)
Received first year of deworming treatment, when offered (1998 for Group 1, 1999 for Group 2)		-0.06* (0.03)			0.03** (0.02)			-0.04** (0.02)	
(Group 1 Indicator) * Received treatment, when offered		-0.14* (0.07)			-0.02 (0.04)			-0.10*** (0.04)	
(Group 1 Indicator) * Group 1 pupils within 3 km (per 1000 pupils)			-0.25* (0.14)			-0.04 (0.07)			-0.18** (0.08)
(Group 1 Indicator) * Group 1 pupils within 3-6 km (per 1000 pupils)			-0.09 (0.13)			0.11 (0.07)			-0.15 (0.10)
Grade indicators, school assistance controls, district exam score control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2328	2328	2328	2328	2328	2328	2328	2328	2328
Mean of dependent variable	0.41	0.41	0.41	0.16	0.16	0.16	0.32	0.32	0.32

<sup>a</sup>Grade 3-8 pupils. Probit estimation, robust standard errors in parentheses. Disturbance terms are clustered within schools. Observations are weighted by total school population. Significantly different than zero at 99 (\*\*\*), 95 (\*\*), and 90 (\*) percent confidence. The 1999 parasitological survey data are for Group 1 and Group 2 schools. The pupil population data is from the 1998 School Questionnaire. The geohelminths are hookworm, roundworm, and whipworm. We use the number of girls less than 13 years old and all boys (the pupils eligible for deworming in the treatment schools) as the school population for all schools.