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Instructions:

- Make sure you are working on your problem set as each problem set is different.
- The answers to the questions of this problem set are to be given exclusively in the answer sheet
- The answers sheet MUST be printed and not photocopied. Photocopies will not be accepted.
- Questions marked with the symbol & admit more than one correct answer
- Please fill the boxes in the answer sheet completely using a black pen as follows

Question 1: B C D E

- The answer sheet must not be creased or folded otherwise your problem set won't be graded.
- You can hand back your problem set at the END of class on Friday, April 29th.



With a sample of 706 observations, we estimate the following model:

$$ln(hwage_i) = \beta_0 + \beta_1 age_i + \beta_2 age_i^2 + \beta_3 educ_i + \beta_4 yngkid_i + u_i$$

and obtain these results:

where *lhwage* is the logarithm of the hourly wage in euro, *age* is measured in years, *educ* is years of education and yngkid is a variable equal to 1 in case the person has a child younger than three years. **Question 1** What is the interpretation of β_4 ?

- A If a person has small kids (< 3 years old), he/she earns about 9.5% more per hour with respect to someone who does not have small kids, ceteris paribus.
- B If a person has one small kid more, he/she earns about 0.095 more per hour with respect to someone who does not have small kids, ceteris paribus.
- C If a person has small kids (< 3 years old), he/she earns about 0.095 euros more per hour with respect to someone who does not have small kids, ceteris paribus.
- D If a person has one small kid more, he/she earns about 9.5% more per hour with respect to someone who does not have small kids, ceteris paribus.

Question 2 What is the interpretation of β_3 ?

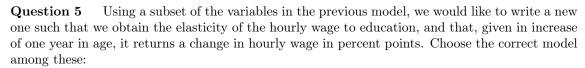
- A One year more of education is associated with a change of about 7% in hourly wage, on average, ceteris paribus.
- B One year more of education is associated with a change of about 0.07% in hourly wage, on average, ceteris paribus.
- C An increase of 1% in education is associated with a change of about 7% euros in hourly wage, on average, ceteris paribus.
- D One year more of education is associated with a change of about 0.07 euros in hourly wage, on average, ceteris paribus.
- E One year more of education is associated with a change of about 0.0007 in hourly wage, on average, ceteris paribus.
- F An increase of 1% in education is associated with a change of about 0.07 euros in hourly wage, on average, ceteris paribus.

Question 3 \clubsuit Is β_2 statistically significant?

- A It is not at 1% level.
- B It is not at 10% level.
- C It is at 5% level.
- D We cannot check for this, it makes no sense.
- E None of these answers are correct.

Question 4 \clubsuit Is β_3 statistically higher than 0.05 at 5%?

- A Yes, it is, since the t-value is smaller than 1.64.
- B Yes, it is, since the t-value is larger than 1.64.
- C No, it is not, since the t-value is smaller than 1.96.
- D No, it is not since the t-value is larger than 1.96.
- |E| None of these answers are correct.



$$\boxed{\mathbf{B}} \ ln(hwage_i) = \beta_0 + \beta_1 age + ln(\beta_2 educ_i) + u_i$$

$$\boxed{C} ln(hwage_i) = \beta_0 + \beta_1 ln(age_i) + \beta_2 educ_i + u_i$$

$$\boxed{D} hwage_i = \beta_0 + \beta_1 ln(age_i) + \beta_2 educ_i + u_i$$

$$\boxed{\mathrm{E}} \ ln(hwage_i) = \beta_0 + \beta_1 age_i + \beta_2 ln(educ_i) + u_i$$

Question 6 Keeping other variables fixed, at what age the logarithm of hourly wage is maximized?

- At about 0, but this makes no sense.
- B At about 93.3 years.
- C At about 56.3 years.
- D At about 46.7 years.

Let us define with Y the amount of cholesterol in mlg in the blood and with Med a dummy variable which takes the value of 1 for medication B and 0 for medication A, where A and B are two different medications that lower cholesterol. Female is a dummy variable which takes the value of 1 for females and 0 otherwise.

Consider the following regression:

$$Y = \beta_0 + \beta_1 \times med + \beta_2 \times female + \beta_3 \times med \times female + u$$

Question 7 Suppose you use this model: $Y = \beta_0 + \beta_1 \times med + \beta_2 \times female + u$ What would be the underlying assumption in this case?

- A Medication A and B do not operate differently between females and males.
- B None of the others.
- C Males and females choose to take the same medication (either A or B).
- D Medication A and B may operate differently between females and males.
- E There are no gender differences in the average cholesterol level.

Question 8 What is the average cholesterol value for women using medication A?

- $A \beta_0$
- $\boxed{\mathbf{B}} \beta_0 + \beta_2$
- $C \beta_2$
- $\boxed{\mathbf{D}} \beta_0 + \beta_2 + \beta_3$
- E None of the others.

These data are taken from the Medical Expenditure Panel Survey survey conducted in 1996. These data were provided by Professor Harvey Rosen of Princeton University and were used in his paper with Craig Perry "The Self-Employed Are Less Likely Than Wage-Earners to Have Health Insurance. So What?" in Douglas Holtz-Eakin and Harvey S. Rosen, eds., Entrepeneurship and Public Po licy, MIT Press 2004.

Among the variables in the dataset, ins is a dummy equal to one if the interviewee has the insurance; selfemp is equal to one if the interviewee is a self-employed workers; gender is equal to one if the in dividual is a male; married is one if the individual is married; health is one if the individual reports to be in good health; educ is 0 if the person has no education, 1 if he/she achieved middle school diploma, 2 for the high school diploma, 3 for the bachelor degree, 4 for the master degree and 5 for the PhD; age is in years and age2 is the square of age.

We estimate two models:

$$Pr(ins = 1|X) = \beta_0 + \beta_1 \times selfemp + \beta_2 \times married + \beta_3 \times gender + \beta_4 \times health + \beta_5 \times gender * health + \beta_6 \times educ + \beta_7 \times age + \beta_8 \times age^2$$

Coefficients:

	Estimate	Std.	Error	t	value	Pr(> t)
(Intercept)	0.297463	4 0	.058024	48	5.1	3 0.	0000	003
selfemp	-0.174236	1 0	.014174	40	-12.2	.9	< 2e	-16
married	0.118106	2 0	.009418	87	12.5	4	< 2e	-16
gender	-0.023227	0 0	.034357	75	-0.6	8	0.49	903
health	0.074431	0 0	.024724	43	3.0	1	0.00	262
genderxhealth	-0.020624	8 0	.035313	31	-0.5	8	0.55	920
educ	0.052980	7 0	.00292	10	18.1	4	< 2e	-16
age	0.010531	5 0	.002748	82	3.8	3	0.00	013
age2	-0.000078	8 0	.000033	33	-2.3	7	0.01	796

Heteroskadasticity robust standard errors used

$$Pr(ins = 1|X) = \Phi(\beta_0 + \beta_1 \times selfemp + \beta_2 \times married + \beta_3 \times gender + \beta_4 \times health + \beta_5 \times gender * health + \beta_6 \times educ + \beta_7 \times age + \beta_8 \times age^2)$$
 (II)

Coefficients:

	Estimate Std.	Error z v	alue Pro	(> z)
(Intercept)	-0.844932	0.195991	-4.31	0.000016
selfemp	-0.651923	0.046842	-13.92	< 2e-16
married	0.455241	0.034845	13.06	< 2e-16
gender	-0.040238	0.111653	-0.36	0.71856
health	0.300503	0.082988	3.62	0.00029
genderxhealth	n -0.124880	0.116613	-1.07	0.28422
education	0.226139	0.012852	17.60	< 2e-16
age	0.029150	0.009899	2.94	0.00323
age2	-0.000162	0.000126	-1.29	0.19821

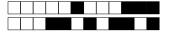
Question 9 What is the interretation of β_2 in model (I)?

- A On average, married individuals are 11.8% less likely than others to have an insurance, controlling for all other factors.
- B On average, married individuals are 11.8% more likely than others to have an insurance, controlling for all other factors.
- C It does not have a proper interpretation.
- D On average, increasing married by one increases the probability to have an insurance of 11.8%, ceteris paribus.



Question 10 Is being self employed significantly linked to having an insurance under model (II)?

- $\boxed{\mathbf{A}}$ No, since the coefficient β_1 is not significant.
- B It depends on the values of all other covariates.
- C Yes, since the model includes the variable "selfemp".
- $\boxed{\mathrm{D}}$ Yes, since the coefficient β_1 is significant.





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- This sheet MUST be printed out and not photocopied. Photocopies will not be accepted.
- Please fill the boxes below completely using a black pen.
- Do not crease or fold.
- You can hand back your problem set by putting it into my mailbox on the fifth floor of the viale Romania campus by noon of Friday, March 25 at noon.

Question 1: A B C D

Question 2: A B C D E F

Question 3: A B C D E

Question 4: A B C D E

Question 5: A B C D E

Question 6: A B C D

Question 7: A B C D E

Question 8: A B C D E

Question 9: A B C D

Question 10: A B C D