

Name: CHIARELLO NICOLE

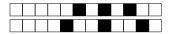
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# Instructions:

- 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.
- $\bullet$  Questions marked with the symbol  $\clubsuit$  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  $\beta_1$ ?

- A Increasing age by one year and keeping its square fixed, the hourly wage increases by 7.1% on average, ceteris paribus.
- B Increasing age by one year, the hourly wage increases by 0.071 euros on average, ceteris paribus.
- C By itself does not have a proper interpretation.
- D Increasing age by one year, the hourly wage increases by 7.1% on average, ceteris paribus.

### **Question 2** What is the interpretation of $\beta_3$ ?

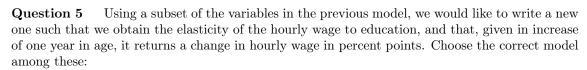
- An increase of 1% in education is associated with a change of about 7% euros in hourly wage, on average, ceteris paribus.
- B One year more of education is associated with a change of about 0.07% in hourly wage, on average, ceteris paribus.
- C One year more of education is associated with a change of about 7% 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 What is our null hypothesis when we test whether  $\beta_1$  and  $\beta_2$  are jointly significant?

- A We check whether the logarithm of hourly wage depends linearly on age.
- B We check whether the logarithm of hourly wage depends on age.
- C We check whether the relationship between the logarithm of hourly wage and age is convex or concave.
- D We check whether the logarithm of hourly wage is 0 when age is equal to 0.

**Question 4**  $\clubsuit$  Is  $\beta_3$  statistically higher than 0.05 at 5%?

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



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

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

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

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

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

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

- At about 56.3 years.
- B At about 46.7 years.
- C At about 0, but this makes no sense.
- D At about 93.3 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 What is the average cholesterol value for women using medication B?

$$A \beta_2$$

$$\boxed{\mathbf{B}} \beta_0 + \beta_1 + \beta_2 + \beta_3$$

$$C$$
  $\beta_3$ 

$$\square$$
  $\beta_2 + \beta_3$ 

[E] None of the above.

Question 8 What is the effect of using medication B with respect to no medication for men?

- A None of the others.
- $\boxed{\mathbf{B}}$   $\beta_1$ - $\beta_0$
- $C \beta_0$
- $D \beta_1$
- $\boxed{\mathrm{E}} \beta_0 + \beta_1$

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 St	td. Error t	value 1	Pr(> t )
(Intercept)	0.2974634	0.0580248	5.13	0.0000003
selfemp	-0.1742361	0.0141740	-12.29	< 2e-16
married	0.1181062	0.0094187	12.54	< 2e-16
gender	-0.0232270	0.0343575	-0.68	0.49903
health	0.0744310	0.0247243	3.01	0.00262
genderxhealth	-0.0206248	0.0353131	-0.58	0.55920
educ	0.0529807	0.0029210	18.14	< 2e-16
age	0.0105315	0.0027482	3.83	0.00013
age2	-0.0000788	0.0000333	-2.37	0.01796

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

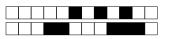
## **Question 9** What is the interpretation of $\beta_6$ in model (II)?

- A Increasing a person's education level by one, on average, makes he/she 22.6% more likely to have an insurance, ceteris paribus.
- B Increasing years of education by one, on average, makes the individual 22.6% more likely to have an insurance, *ceteris paribus*.
- C It does not have a proper interpretation in terms of magnitude.
- D Increasing years of education by one, makes the individual 22.6% ore likely to have an insurance, holding all other things constant.



## **Question 10** What is the interretation of $\beta_2$ in model (II)?

- A On average, married individuals are 45.5% more likely than others to have an insurance, controlling for all other factors.
- B On average, a married worker has a probability of 45.5% to have an insurance, ceteris paribus.
- C On average, married individuals are 45.5% less likely than others to have an insurance, controlling for all other factors.
- D It does not have a proper interpretation in terms of magnitude.





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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

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