ISEG – Lisbon School of Economics and Management
ECONOMETRICS
First Semester 2016/2017
Problem Set III – Dummy variables

Question:	**1**	**2**	**3**	**4**	**5**	Total
Points:	4	4	4	4	34	50

Justify all your answers. You are required to show your work on each problem on this problem set. **Organize your work**. Work scattered all over the page will receive very little credit. A correct answer in a multiple choice question is worth 4 points; an incorrect one is worth −1 point.

(4) **1**. Consider the population regression of log earnings, y_i, against two binary variables: whether a worker is married, D_{i1}, where $D_{i1} = 1$ if the ith person is married, and the worker's gender, D_{i2}, where $D_{i2} = 1$ if the ith person is a female. Consider the following model:

$$y_i = \beta_0 + \beta_1 D_{i1} + \beta_2 D_{i2} + \beta_3 D_{i1} D_{i2} + u_i$$

The interaction term:

- ◯ Does not make sense since it could be zero for married males
- ◯ Allows the population effect on log earnings of being married to depend on gender
- ◯ Indicates the effect of being married on log earnings
- ◯ Cannot be estimated without the presence of a continuous variable

(4) **2**. Suppose that you have estimated the following regression models to explain the wage of an individual measured in dollars per hour:

$$\widehat{wage} = -2.01 - 1.52 female + 0.77 educ + 0.05 exper$$

$$\widehat{wage} = 8.10 + \hat{\delta} female$$

where $female$ is a dummy variable that is equal to 1 if the individual is a woman. You know from the sample that the average wage of men is 8.10 dollars per hour while the average wage of women is 6 dollars per hour. Then $\hat{\delta}$ is,

- ◯ -1.52
- ◯ 6.00
- ◯ -2.10
- ◯ unknown because there is not enough information to obtain it

(4) **3**. The dummy variable trap implies that,

- ◯ The OLS estimator for all the coefficients is not identifiable due to perfect collinearity.
- ◯ The OLS estimator for all the coefficients is not identifiable due to extremely large standard errors.
- ◯ The OLS estimator is biased.
- ◯ There are not enough dummy variables in the model.

(4) **4**. Consider the regression model:

$$\widehat{log(bweight)} = 4.706 + 0.032male - 0.005cigs + 0.016log(income)$$

where *bweight* is the birth weight of a baby in ounces and male a is dummy variable that is equal to 1 if the baby is male. The interpretation of the coefficient of male is,

- ◯ a male baby weights more in average 0.032 ounces than a female (holding all the other factors fixed)
- ◯ a male baby weights more in average 3.2 ounces than a female (holding all the other factors fixed)
- ◯ a male baby weights more in average 0.032% than a female (holding all the other factors fixed)
- ◯ a male baby weights more in average 3.2% than a female (holding all the other factors fixed)

5. A private academic audit company came to ISEG in order to analyze the pedagogical productivity of the teaching team in the Mathematics Department. They were interested in studying the course evaluation as a function of pedagogical and personal characteristics. Use the data set Teachingratings.WF1 to estimate the following model:

$$\begin{aligned} CourseEval_i = {} & \beta_0 + \beta_1 Beauty_i + \beta_2 Optional_i + \beta_3 Minority_i + \beta_4 NNEnglish_i \\ & + \beta_5 Female_i + \beta_6 Beauty_i \times female_i + u_i \end{aligned}$$

where:

- ***CourseEval*** is the teaching evaluation score, on a scale of 1 (very unsatisfactory) to 5 (excellent);
- ***Beauty*** is the average rating of instructor physical appearance by a panel of six students;
- ***Optional*** is equal to 1 if the course is optional;
- ***Female*** is equal to 1 if instructor is female;
- ***Minority*** is equal to 1 if instructor is a non-White;
- ***NNEnglish*** is equal to 1 if the instructor is not a native English speaker.

(5) (a) Interpret the estimated coefficient $\hat{\beta}_2$ and discuss the respective sign.

(7.5) (b) Determine the difference in the estimated teaching evaluation score of an instructor that is not a not a native English speaker and teaches an optional course (holding all the other factors fixed).

(10) (c) Interpret the estimated coefficients of $\hat{\beta}_1$ and $\hat{\beta}_6$ and comment.

(4) (d) Estimate the equation,

$$CourseEval_i = \beta_0 + \beta_1 Beauty_i + \beta_2 Optional_i + \beta_3 Minority_i + \beta_4 NNEnglish_i + v_i$$

separately for male and female instructors and discuss briefly the results.

(7.5) (e) Perform a Chow test using the results you obtained above and conclude.