Week 5 Self Assessment 4

Q1) What is the orthogonality assumption in OLS, taking Y = a + bX as the model, and error term is e? (e is Epsilon)

(A) Correlation(X , X) = 0
(B) Correlation(X, e) = 0
(C) Correlation(e , X) = 1
(D) None of the above

Ans: (B)
The orthogonality assumption in OLS is that the error terms and predictors are not related at all. (Week 5, Lesson 2)

Q2) While calculating a difference in difference, we run a regression which is as follows: lm(y ~ d1 +d2 + d3) where d1 and d2 are dummy variables and d3 is their interaction term. We thus get its coefficients according to the equation: Y = a + b*d1 + c*d2 + d*d3
What is the difference in difference estimator?

(A) a+b+c+d
(B) (d-c)-(b-a)
(C) a
(D)d

Answer: (D) d
Difference in difference estimator is given by coefficient of interaction term
(Module 5,Slide 20)

Q3) We want to observe a column "y" in dataset. We divide the observations into 2 parts, where y_0 is the set of observations of control group and y_1 is the set of observations of treatment group. (Let function mean(X) gives the mean value of X)
What is the difference estimator given by?

(A) mean(y_1) – mean(y_0)
(B) Covariance(y_1, y_2)
(C)1 – mean(y_1)/mean(y_2)
(D) Var(y_2)

Answer: (A) Difference estimator = Cov(y1,y0)/Cov(y0,y0) = mean(y_1) – mean(y_2)
(Module 5, Slide 8)

Q4) True or False: The weakest linear relationship is indicated by a correlation coefficient equal to -1.

A. True
B. False

Answer: B. False. The weakest linear relationship is indicated by a correlation coefficient equal to 0.

Q5) Which of the following is example of a natural experiment?

A. One state, but not others, increases income tax
B. Changing store policy to allow online orders to be picked up in any store
C. A mobile carrier implements an unlimited data plan open to all customers
D. Testing new plant growth in different soil conditions in a lab

Answer: A. One state, but not others, increases income tax

(Definition in Slide 15)

Q6) Researchers compare the average change over time of the independent variable for the treatment group to the average change over time of the independent variable for the control group. This comparison is called difference in difference.

A. True
B. False

Answer: B. False. Difference in difference is the comparison of the average change over time of the dependent variables for the treatment group compared to the control group.

(Definition in Slide 15)

Q7) Which of the following is an indication that there is random assignment in an experiment?

A. The coefficients of the regression model are all approximately equal to 1.
B. The intercept of the regression model is equal to 0.
C. The coefficients of the regression model are all significant.
D. The coefficients of the regression model are all insignificant.

Answer: D. The coefficients of the regression model are all insignificant.

Module 5, Lesson 4

Q8) The range of values of correlation is:

A. [0,1]
B. [-1,0]
C. [-1,1]
D. [-∞,∞]

Answer: C

Q9) To estimate the causal impact of a treatment, we need to compare the treatment outcome to the:

A. Counterpoint
B. Counterfactual
C. Correlation
D. Confusion Matrix

Answer: B. Module 5, Lesson 5

Q10) How can selection bias be avoided?

A. Randomized controlled experiment
B. Natural experiment
C. Add control variables
D. All the above

Solution: D. Read Week 5 slide 6