

BUS 735: Business Decision Making and Research

Instructor: Dr. James Murray

In-class Exam 1 - Fall 2014

Monday, October 20, 2014

Directions: Write your answers in the space provided. For every problem, first write down what statistical test or procedure you are using to answer the question. Some statistical procedures, like regression and analysis of variance, include many hypothesis tests. In such events, write down both the statistical procedure, and the hypothesis test you are using. For every hypothesis test, be sure to include every step of hypothesis testing.

1. The dataset `TeacherRatings.sav` contains data on average course evaluations (on a continuous scale from 0.0-5.0) for 463 courses for the academic years 2000-2002 at the University of Texas at Austin. The dataset includes a dummy variable for whether the instructor identified himself or herself as a racial minority (`minority=1` if a minority, `minority=0` otherwise), age (in years), gender (`female = 1` if female and `female = 0` otherwise), whether or not the course was a one-credit course (`onecredit=1` if one credit, `onecredit=0` otherwise), a rating of instructors' physical appearance by a panel of six students, averaged across the six panelists, on a continuous scale from 1-10, and whether or not the course was an introductory course (`intro=1` if introductory, `intro=0` otherwise).
 - (a) Test the hypothesis that minority instructors have different evaluation scores on average than non-minority instructors.
 - (b) Estimate a regression that uses all the given instructor and course characteristics to predict an instructor's expected evaluation score. Write down the estimated regression equation.

- (c) Using the regression results in question (b), test whether or not the physical appearance of the instructor affects his or her evaluation score.
- (d) Describe whether and how instructor age influences evaluation scores.
- (e) What percentage of the variability in course evaluation is predicted by your explanatory variables. Note that none of your explanatory variables capture anything about teacher quality. Can you draw a recommendation for university policy makers using instructor evaluations for personnel decisions?
- (f) What would you predict would be the evaluation score for your BUS 735 instructor, someone who is a male non-minority instructor, 35 years old, is not teaching a one-credit course or introductory course, and is incredibly good looking (beauty=10)?

2. The dataset `salesrev.sav` contains the monthly sales revenue (in thousands of dollars) for 200 sales people for a large national corporation. The sales people focus on one of two categories of products, which are labeled as Product 1 and Product 2 in the dataset. Also included in the dataset is the years of experience each sales person has. The company introduces a new sales person training program. The training program involves three full day training sessions, one training session is offered each month for three months. The 200 sales people participate in the training program, and the company gathers data on the monthly sales before the training (`Sales0`), after the first training session (`Sales1`), after the second training session (`Sales2`), and after the third and final training session (`Sales3`). For the following questions, test the appropriate hypothesis and report your conclusion.
- (a) Is there evidence that the three-part training program positively influences sales (comparing before the first training session and after the last training session)?
- (b) Do all of the training sessions lead to an increase in sales revenue? If not, which training sessions do you find evidence that are effective, and which training sessions do you fail to find evidence that they are effective?
- (c) Taking into account the effect of years experience, is there a difference in sales revenue after the final training session between sales people who sell Product 1 versus Product 2?

- (d) Taking into account the effect of product type, does years experience influence sales revenue after the final training session?

3. The dataset `cps.sav` contains information about union membership and background characteristics for 1084 individuals. The variables include,

- `educ`: years of education
 - `south`: dummy variable = 1 if employee lives in the South
 - `nonwhite`: dummy variable = 1 if employee is not white
 - `female`: dummy variable = 1 if employee is female
 - `exper`: years of experience
 - `y85`: dummy variable = 1 if year of the observation is 1985, = 0 if the year of the observation is 1978
 - `union`: dummy variable = 1 if the employee is a member of a labor union.
- (a) Estimate a logistic regression that predicts the probability that a person is a member of a union based on all the other variables given above. What is your estimated regression equation?

- (b) Is there evidence that males and females have different propensities to be a member of a union, given the other variables in your model? If so, which gender is more likely to be a member of a union?

(c) Use your regression model to predict the probability that a white woman from Wisconsin with 12 years of education and 12 years of experience was a member of a union in 1985.

(d) What is the marginal effect on the probability of union membership for living in the South, for a person similar to the one described in the previous question?