BUS 735: Business Decision Making and Research
Homework: Logistic Regression
Fall 2013: Due Tuesday, October 1, 2012

Learning Objectives:

- LO2: Be able to construct and use multiple regression models (including some limited dependent variable models) to construct and test hypotheses considering complex relationships among multiple variables.
- LO6: Be able to use standard computer packages such as SPSS and Excel to conduct the quantitative analyses described in the learning objectives above.
- LO7: Have a sound familiarity of various statistical and quantitative methods in order to be able to approach a business decision problem and be able to select appropriate methods to answer the question.

Directions: Type up your answers in a single word document, and include the relevant SPSS tables that you cite copied and pasted into the word document. When asked "Test the hypothesis.." or "Is there evidence of.." or "Is there statistical significance of.." conduct the appropriate hypothesis test, following these steps (in order):

- Indicate what statistical test / statistical method you are using.
- State the null and alternative hypothesis.
- Report the p-value.
- Conclude whether you reject or fail to reject the null hypothesis.
- State your result in plain English.

The homework assignment uses a dataset consisting of 753 married women in the United States and information about whether they participate in the labor market (either they have a job or are actively looking for one) and background information on them and their families. The variables include,

- `inlf`: Or "In Labor Force" which is a dummy variable equal to 1 if the woman is in the labor force and 0 if not.
- `kidslt6`: Number of children under age of 6.
- `kidsge6`: Number of children age 6-18.
- `age`: age of the woman
- `educ`: Number of years of education of the woman
- `hushrs`: Number of hours per year that the husband works.
- `huseduc`: Number of years of education of the husband.
- `motheduc`: Number of years of education of the woman's mother.
- `fatheduc`: Number of years of education of the woman's father.
- `city`: Dummy variable equal to 1 if the woman lives in a city (metropolitan statistical area).

1. Is there a difference in the number of hours husbands work per year between women that do participate in the labor force and women that do not? If so, which group has husbands that work more hours on average?

2. Is there a relationship between the years of education of the woman and the years of education of the mother? If so, describe the nature of the relationship.

3. Is there a relationship between whether or not the woman participates in the labor force and the number of children under the age of 6.

4. Estimate a logistic regression using `inlf` as the outcome variable and all other variables as explanatory variables, and answer the following questions:

   (a) For which variables is there statistical evidence that the variable influences whether or not the woman participates in the labor market?

   (b) For the women that participate in the labor market, what percentage of these does the logistic regression model correctly predict that they participate in the labor market?

   (c) For the women that do not participate in the labor market, what percentage of these does the logistic regression model correctly predict that they do not participate in the labor market?

   (d) What is the probability that a woman with the following characteristics will participate in the labor market?

   - The woman has two kids, ages 6 and 7.
   - The woman is 30 years old.
   - The woman has 16 years of education.
   - The husband works 2000 hours per year.
   - The husband has 16 years of education.
   - The woman's father and mother each have 12 years of education.
   - The woman does not live in a city.

   (e) How much more likely does a woman like the one described in the problem above participate in the labor market if she has one additional child ages 0-5?

   (f) How much more likely does a woman like the one described in the problem above participate in the labor market if she lives in a city?