

## **BUS 735: Business Decision Making and Research**

### **Homework: Logistic Regression**

**Due Monday, October 6**

#### **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. In the labor force means that the woman is either employed or is actively seeking employment.
- **kids1t6:** 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.
- **amotheduc:** 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 relationship between the years of education of a woman and whether or not she decides to participate in the labor market? If so, do women who participate in the labor market on average have more or less years of schooling than women who do not?
2. Is there a relationship between the years of education of the woman and the years of education of the husband? 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) Comment on the in-sample accuracy of the logistic regression model by answering the following questions:
    - 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?
    - 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?
    - Based on these findings, do you find that the logistic regression model predicts well women's decisions to participate in the labor market?
  - (c) What is the probability that a woman with the following characteristics will participate in the labor market?
    - The woman has three kids, ages 4, 6 and 7.
    - The woman is 38 years old.
    - The woman has 16 years of education.
    - The husband works 2500 hours per year.
    - The husband has 12 years of education.
    - The woman's father and mother each have 16 years of education.
    - The woman does live in a city.
  - (d) 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 year of education?
  - (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 over the age of 6?