Lab 3 – Multinomial Choice in Revealed and Stated Preference Data

Based on conditional logit choice data. N = 210 individuals making one choice among 4 alternatives. Travel between Sydney and Melbourne by AIR, TRAIN, BUS or CAR
Examine various specifications based on

\[ \text{Choice}_{ij} = f(\text{in vehicle cost, in vehicle time, generalized cost, terminal time}) \]

We will look at several specifications of the choice model and aspects of multinomial choice analysis
The script and data set for this exercise are in files

    Lab3-2015.lim
clogit.lpj.

A second set of exercises examines a stated choice experiment; individuals choose one of 3 brands of shoes represented by a bundle of attributes or none of the offerings. N = 400 individuals, each making one Among 4 choices, in a sequence of 8 choice situations. Examine aspects of the specification

\[ \text{Choice}_{ijt} = f(\text{fashion, quality, price, gender, age}). \]

The script and data set for this exercise are

    Lab3-2015.lim
brandchoicesSP.lpj

I. Revealed Preference Analysis

A. Essential Multinomial Logit Form
Examine the basic results from estimation of the MNL model. There are two different formats used to specify the model. A multinomial probit model might be an alternative.

B. Constrain Value of Waiting Time to Equal Value of Travel Time
Use a likelihood ratio test to determine if marginal (dis)utility of travel time is the same as the marginal disutility of waiting time. What does the test result suggest?

C. Value of Travel Time Saved
Use ratio of marginal utilities to estimate willingness to pay for a shorter trip. What is the value in $ per hour? (This is in about 2002).

D. Elasticities of Substitution
Examine elasticities of substitution between alternatives. Notice the characteristic pattern of cross elasticities in a multinomial logit model. First form presents only average partial effects. Second form includes statistical results, sample variation of partial effects and asymptotic distribution of estimated average partial effects based on Krinsky and Robb method.

E. Examine Model Predictions
What happens to the predicted market shares when an attribute of a choice changes. In the first scenario examined, the cost of air is increased by 25%. What happens to the market shares? Suppose the cost of car increased instead of air? What if air and car both became more expensive?
F. **Hausman Test of IIA**
   The IIA assumption implies that a model based on a restricted choice set is still an MNL with the same parameters. The Hausman test compares the coefficients from a full model to those from a restricted model that has a smaller choice set. What is the result of the test?

G. **Nested Logit**
   The nested logit specification slightly relaxes the IIA assumption of MNL. We fit two different nested logit models. The first is loosely based on intuition about types of travelers. The second is a natural segmentation based on the modes themselves.

**II. Stated Preference Analysis**

A. **Examine Revealed Preference Data**

B. **Basic Multinomial Choice Model**
   Fit the simplest MNL and compute willingness to pay. WTP values are found in the matrix WTP_I in the project window. Just double click the name of the matrix.

C. **Correct Choice Model**
   The actual simulation is based on a model that includes the square of price in the utility function. Do the results support this extension of the model?

D. **Gender difference in Preferences**
   Do men and women have different marginal utilities of fashion? Fit the model with different coefficients on fashion for men and women. What do the test results suggest?

E. **More General Gender Differences**
   Do men and women have generally different preferences for shoes? Test the homogeneity hypothesis using a likelihood ratio test? What do the results suggest?

F. **Latent Class Model**
   The actual data generating mechanism for these simulated data is a three class latent class model. The LCM also accounts for the fact that each individual makes 8 choices – the sample is 400 joint sets of 8 choices, not 3200 choices.

G. **More General Latent Class Model**
   The actual process underlying these data is the LCM in part F, but the prior class probabilities (as is often the case in applications) depend on demographics, here gender and age.