EPFL
ENAC TRANSP-OR
Prof. M. Bierlaire

Mathematical Modeling of Behavior
Fall 2020

LAB SESSION 10

The objective of this lab is to become familiar with the Nested Logit (NL) and Cross-Nested Logit (CNL) models. For this purpose, you will be working with the *Residential Telephone Services* case study.

First, download the `Case study lab 10.zip` file in Moodle. It contains:

1. the model specification files (as both script files `.py` and Jupyter notebooks `.ipynb`)
   - `MNL_Tel_generic`,
   - `GEV_Tel_NL_unrestricted`, and
   - `GEV_Tel_CNL_fix`
2. the solution file `10Lab2020_solution.pdf` with the models you are asked to develop and test.

The base multinomial logit specification for this case study (`MNL_Tel_generic`) is provided as a benchmark for comparison with the nested specifications that you will test.

Data
This lab uses `telephone.dat`, which is collected by RP survey in 1984 in Pennsylvania. To obtain the dataset, jump to the link under **Datasets** in Moodle. You can also find the dataset description and go through it to get insights into the choice problem.

Practice
Now, estimate the MNL and the NL specifications, provided in the `MNL_Tel_generic` and `GEV_Tel_NL_unrestricted` files respectively, and perform the following tasks:

1. Develop and estimate the remaining NL specifications described in `10Lab2020_solution.pdf`.
2. Repeat the specification tests to decide if these NL specifications are accepted or rejected against the logit model.
3. What assumptions do the nesting structures that you have tested reflect?

Finally, estimate the CNL specification with *fixed* α's that is provided in the file `GEV_Tel_CNL_fix` file, and perform the following tasks:

1. Develop and estimate the specification of the CNL model with *unknown* (variable) α's.
2. What assumptions do the cross nesting structures that you have tested reflect?

---

rk / th / no / mpp / jp / mw