# GEO Skills: Research Methods & Techniques

## Assignment 3. Application of Multinomial Logistic Regression

In this last assignment for the quantitative methods component, a multinomial logistic regression analysis is conducted to explain the frequency of contacts with people in the neighborhood from individual, household and neighborhood characteristics. You will apply a multinomial logistic regression analysis to a survey conducted in Amsterdam by OIS, *Staat van de Stad 2014* on Canvas. A potential dependent variable for this exercise is the question 4 in the questionnaire (V4) including five categories contact frequency. You need to recode this variable to limit the number of categories to 3 : 1) intensive, 2) moderate and 3) low. For this assignment, you may choose your explanatory variables from the variable list. Please consider theoretically most relevant explanatory variables up to 8. The questionnaire (in Dutch) can help you to find potentially relevant variables and, there are some variables that were already created from originals in the end of the list. Some of these new variables may be ready to use for your purpose. Please note that effects of your selected variables need not be always statistically significant. Theoretical considerations is a part of this selection.

This assignment builds on the earlier ones and is supposed to use all knowledge about advanced data analysis accumulated up to now. The results of your data analysis should be used to write a small paper (max 3 pages, including all tables and figures – only excluding do-file appendix). This paper ought to include basic components of an empirical paper, as given below and, to reflect briefly on the quantitative approach.

While writing this paper, at least one academic article (either self-found or from the list of example articles in the course manual) should be closely read, understood and to serve as an example of how to report statistical findings (i.e. how to present the data clearly, what to include, what to report on, being concise while being transparent, etc.). Make sure to refer to this article in your report.

**Answering a research question in a small report**

Please report your (only) relevant results in a small paper (max three pages) using (a selection of) the analysis. The aim of this paper is answering a research question in a well-structured “paper” by examining data. The following work process can guide you in structuring your paper which should have about the format of an paper in quantitative research (see below).

* Introduce the topic, think up a research question and describe your method briefly.
* Formulate your expectations (hypotheses) regarding separate explanatory variables. The estimation results will provide necessary information to reject/accept these hypotheses.
* Report *only* results which contribute to telling a coherent argument and facilitate accountability and replication of your analysis.
* You should compose your own tables and figures from the Stata-output to convey information optimally. Tables and/or figures should be well-formatted. Please pay attention to titles, labels, colors, content (when percentages or frequencies) etc. Ideally, your layout should satisfy a ready-to-submit state of an academic paper.
* Pay attention to significance levels, direction/magnitude of effects and possible multicollinearities; How can you interpret the estimation results? Do you have expected results?
* Try to present your results concisely and convincingly.

This assignment must be carried out in groups of three students as published on Canvas, with the help of lecture notes, do-file(s) and online resources.

## Structure of an academic paper in quantitative research

***Introduction***: relevance of the topic and introducing research question and how to answer (your strategy and method)?

***Theory*** (less relevant for this course): positioning in literature and theoretical arguments for the analysis from which a couple of hypotheses are driven.

***Data* *and Method***: description of data and (regression) method.

Introducing variables and presenting descriptive statistics. Sometimes bivariate analysis.

***Regression analysis***: introducing, presenting and describing estimates and discussing results.

***Conclusions:*** a very sort summary of what has been done to answer the research question and highlighting major findings and their implications for theory. What have we learnt from the analysis? Some reflections on your data, methods, analysis and findings.

### Workflow of data analysis

**Relevant Stata commands:**

describe, summarize, tabulate, histogram, kdensity

Generate, replace

Scatter, lfit, correlation, mlogit,

(ib#. ; Estimates store; Estimates table)

**Step 1 inspecting variables**

* Inspect your variables by descriptive statistics (*command: summarize*)
  + *Continue var: summarize, histogram, kdensity,*
  + *Factor var:* tabulate

**Step 2 Preparing variables**

Prepare your dependent variable (*a factor variable with three categories*; say *ownership*) and the independent variables for the regression analysis.

* Create new variables from originals if necessary; for example to exclude potential outliers, to make interpretation easier or to avoid skewed distribution.

**Step 3 Descriptive statistics (to report)**

* Calculate descriptive statistics for your variables.
* Compose a table for descriptive statistics, including ***only*** necessary information.

**Step 4 Regression analysis**

* Run linear regression model(s) using the explanatory variables prepared in step 2.
* Compose another table from your regression output(s), including ***only*** necessary information.

**Step 5 Reporting marginal effects**

* Calculate marginal effects for factor variables
* Present the marginal effects next to the coefficients or relative risk ratios (rrr).

Please add your do-file to the paper as appendix.

**Assessment Criteria**

Assessment of the quality of your work will be based upon:

* Meeting the submission criteria
* Structure and format of the paper
* Correct use of variables
* Transparency / replicability
* Presentation of results
* Interpretation of results
* Demonstration of understanding of statistical analysis
* Creativity to answer the research question
* Critical reflections

**Submission deadline**: Tuesday 24th of September 2019 at 10:00. Please post your paper (as a single document and your do-file in appendix) through Canvas (box: Assignment 1) and hand in a hard copy of your paper at the lecturer’s pigeonhole.

**Reflections on the quantitative method**

In this last assignment for this module, you have opportunity to reflect on what you have learned up to now. Do you think that having the quant method is worth for your professional career? Do you see any opportunity to apply a regression analysis to a topic in your field of interest?