PRACTICAL MULTILEVEL MODELING

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Short bio

Leonardo Grilli is Associate Professor of Statistics at the University of Florence and Director of the Master program in Statistics, actuarial and financial sciences. He graduated in Economics in 1996 and earned a Ph.D. in Applied Statistics in 2000. The teaching activity focuses on introductory statistics and statistical modelling, including generalized linear models and multilevel models. The research activity follows two main pathways: a) random effects models for multilevel analysis, with methodological advances concerning the specification and estimation of models in complex frameworks such as duration data, multivariate qualitative responses, informative sampling designs, and sample selection bias; b) methods of causal inference and effectiveness evaluation based on potential outcomes, with methodological contributions in the principal stratification framework. The methodological work is accompanied by applications in different fields, such as education, economics, demography, and medicine. He is associate editor of Statistical Methods and Applications.

Carla Rampichini graduates in Economics in 1991 and earned a Ph.D. in Applied Statistics in 1995. Her teaching activity focuses on introductory statistics, multivariate analysis and statistical modelling, including generalized linear models and multilevel models. She is a member of the board of the PhD in Economics at the University of Florence. Her research interests relate to random effects models for multilevel analysis, program evaluation, and causal inference. Her methodological work is joined with applications on real data, often concerning the effectiveness of universities (e.g., student ratings, evaluation of university grants, graduates' satisfaction, job placement of graduates). She is fellow of the Royal Statistical Society and of the Italian Statistical Society. She is co-editor of Statistical Methods and Applications and she has served as referee for many national and international journals.

Course description

The course introduces the concepts of multilevel analysis, whose main aim is to model the relationships between and within groups. Typical situations include individuals clustered into families, schools, firms, geographical areas. The course focuses on the two-level linear model as a template to illustrate issues of specification, estimation and inference. The main ideas are illustrated through case studies. A typical field of application is education, where students are clustered into schools: one of the case studies aims at assessing the role of student and school factors on student achievement. Another field of application is public health, as illustrated by a case study concerning the relationship between smoking behaviour of pregnant women and birth weight of their newborns. A common use of multilevel models is in the analysis of cross-country data such as the European Social Survey: one of the case studies concerns political trust in Europe, considering individual and country-specific characteristics. The case studies are worked out with Stata 14. Moreover, each lesson includes guided exercises using

Stata. Special attention is devoted to critical and controversial issues, such group-mean centering of the covariates, sample size requirements, choosing between fixed and random effects, and using sampling weights.

Software

Stata 14

Prerequisites

Basic knowledge of statistical inference and linear regression. Knowledge of Stata is helpful but not necessary (files with commands are always provided).

Schedule

July 3 2017

Time	Topic
9:00 -11:00	Basics of multilevel analysis: theory
11:00-11:20	Break
11:20-13:00	Basics of multilevel analysis: case study 1

July 4 2017

Time	Topic
9:00 -11:00	Model specification, estimation and inference: theory
11:00-11:20	Break
11:20-13:00	Model specification, estimation and inference: case study 2

July 5 2017

Time	Topic
9:00 -11:00	Further topics: Fixed and random effects, non-nested structures
11:00-11:20	Break
11:20-13:00	Case study 3

References

Course largely based on:

Rabe-Hesketh and Skrondal (2012). *Multilevel and longitudinal modeling using Stata*, 3rd ed, Stata Corp.

Snijders T.A.B. and Bosker R.J. (2012). *Multilevel Analysis: An introduction to basic and advanced multilevel modeling*, 2nd ed., Sage Publishers.