

Design, evaluation and analysis of questionnaires for survey research I

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In this course we combine three topics: the evaluation and testing of causal hypotheses, the design and evaluation of measurement instruments, and the combination of the two using Structural Equation models. Survey research is the most commonly used data collection method in the social sciences. Like all data collection methods this procedure contains errors which will affect the results of the data analysis. Given this situation, in this course we will discuss the analysis of survey data taking into account measurement error.

1. Content of the course

First we will discuss the designs for testing causal hypotheses (experimental and non-experimental) and the connected statistical analyses. After that the course will concentrate on non-experimental research. In that part the transformation of verbal theories into testable propositions will be given a lot of attention as an essential part of non-experimental research.

After this general introduction of the SEM approach we will move on to the problem of measurement errors. Most of the time observed variables contain measurement errors and systematic errors because they are not only affected by the variables they are supposed to measure but also by other variables. Structural equation modeling can also be used to design and evaluate measurement instruments. Therefore this will be the second part of the course.

The third part will concentrate on the evaluation of causal hypotheses taking into account measurement error. In order to do so, we introduce a general model for structural equations which is a combination of a simultaneous equations model and a measurement model. This general model allows the specification, estimation and testing of all known linear structural equation models. However, because the models get rather complex with a structural part and a measurement part, we will discuss an alternative for the analysis. It is a two steps procedure where in the first step composite scores are estimated for all concepts including their quality and in the second step the analysis is done with a simple model but correcting for the biasing effect of the limited quality of the composite scores.

2. Prerequisites

The prior knowledge to participate in this course is rather limited but it helps to know the basic concepts of descriptive statistics like mean, variance, standard deviation, covariance, correlation and regression.

3. Competences to be achieved

The purpose of the course is that the students:

- become aware of the major problems which are connected with survey research,
- are able to design a model based on theoretical considerations,
- can evaluate the quality of questionnaires of other people,
- see the effects of measurement error on data analysis,
- are able to analyze survey data with measurement errors.

4. Assessment

During the course, students are supposed to work on a problem of their own choice for which data are available. At the end of the course they are supposed to present the results of their analyses in the last class and on paper. The length of the paper should be between 8-10 pages, not including appendices. The paper can be prepared by groups of maximum 3 persons.

The program

<i>meeting</i>	<i>topic of the class</i>
1	Different designs and formulation of causal theories
2	Formulation of linear structural equation models
3	From concepts to questions
4	Measurement models and their evaluation
5	Description of data from a population
6	Introduction to identification
7	Estimation and testing
8	The Full SEM model plus derivations
9	Index construction and quality evaluation
10	Data analysis with correction for measurement error

Main Literature:

Saris W.E. and H. Stronkhorst (1984) Causal modeling in nonexperimental research: An introduction to the LISREL approach. Amsterdam. Sociometric Research Foundation.

Saris W.E. and I.N. Gallhofer (2007) Design, evaluation and analysis of questionnaires of surveys research. Wiley

For statistically advanced people:

Bollen K.A. (1989) Structural Equations with latent variables. New York, Wiley

Additional literature:

Andrews F. M. 1984. Construct validity and error components of survey measures: A structural equation approach. *Public Opinion Quarterly*, 48, 409-442.

Bollen K.A. and R.Lennox (1991) Conventional Wisdom on measurement: A Structural Equation Perspective. *Psychological Bulletin*, Vol 110, 305-314.

Jöreskog K.G. 1971. Simultaneous factor analysis in several populations, *Psychometrika*, 34, 409-426.

Saris W.E, A.Satorra and D.Sörbom (1987) Detection and correction of structural equation models. *Sociological Methodology* 1987, 105-131.

Saris W.E., A.Satorra and G.Coenders (2004) A new approach for evaluating quality of measurement instruments, *Sociological Methodology* 2004, 311-347.

Saris W.E. , A. Satorra and Van der Veld (2009) Testing structural equation models or Detection of misspecifications. *Structural Equation Modeling* , 16, 561-582.