

Quantitative Methods

I. Objectives

The course is addressed to those, who are going to prepare empirically oriented Master thesis. Its aim is to provide participants with basic inferential statistics concepts and simple multivariate analytical tools and help them to avoid typical mistakes and traps in applying them to survey data analysis.

Entry requirements for participants: well-grounded elementary statistics course, operating SPSS package.

II. Short description of the course

The course is dedicated to three issues of survey data analysis.

At the beginning, basics of **factor analysis** will be presented: its assumptions, formal properties and applications to the problem of scale construction and validation. As an example will serve data on social inequality perception (ISSP 1992) and scales used by Inglehart in World Values Survey project.

Next, multivariate regression will serve as tool of causal modeling.. Scales and indexes obtained thanks to factor analyses will serve as dependent variables in simple **path models** of attitudes formation. Simple techniques of identifying model parameters and investigating path model properties will be discussed. Examples from mobility studies will be used.

Finally, consequences of **rate of sample exhaustion** (response rate) for effectiveness of statistical inferences will be discussed. PGSS data on legalization of abortion will serve as an illustration of the problem of predicting distribution of public opinions and its change.

The course has two components: theoretical and practical one. Necessary statistical foundation will be presented during the lectures. Analyses of data from CSS survey data banks will serve as an exemplification of solutions proposed by theory. Simultaneously with lectures participants will do simple homework - analysis of artificial data prepared by lecturer which results will be discussed during lectures. Necessary information on SPSS analytical procedures will be briefly introduced before.

Detailed terms for each session are included in the “**Quantitative Methods – Timetable**” document.

III. Requirements for completion

Participants will select two countries from CSS survey data banks. Using these data sets they will prepare essay (3000 words), in which statistical tools presented during the lectures will be applied. General requirements for the report are described in chapter **VI**. Detailed requirements are enclosed in “**QuantitativeMethodsReportRequirements**” document.

IV. Content

1. Exploratory factor analysis as a scaling tool (sessions 1-6)

Readings:

Kim, Mueller (1978a)	chapter II	Logical Foundations of Factor Analysis, pp. 12-46
	chapter III	Obtaining Factor Analysis Solutions, pp. 46-71
Kim, Mueller (1978b)	chapter II	Methods of Extracting Initial Factors, pp. 12-28
	chapter III	Methods of Rotation, pp. 29-40
	chapter IV	Number of Factors Problem Revisited, pp. 41-45
	chapter VI	Construction of Factor Scales, pp. 60-73
	chapter VII	Brief Answers to Questions Frequently Asked, pp. 73-78,
Inglehart et. Al. (2000)		SPSS CODING INSTRUCTIONS FOR Materialist/Post-materialist Values INDICES; p.179

2. Path models of political attitudes formation (sessions 7-9)

Readings:

Schroeder L. D. et al. (1986)	chapters 1-3:	pp. 11-53
Asher (1976)	chapter 3:	pp. 29-49
Davis (1985)	chapters 1-4:	pp. 7-69
Kim, Kohout (1975 b)	chapter 21:	Special Topics in general linear models: 21.1. Non-linear relationship, pp. 368-373, 21.3. Path analysis and causal interpretation, pp. 383-397
Słomczyński (1989)	chapter 2:	Attainment of occupational status, pp. 32-57.

3. Estimation of population proportion based on survey data: bias due to non-availability (session 10-12)

Readings:

Pfaffenberger (1987)	chapter 8:	Samples and sampling distributions, pp. 305-348.
Pfaffenberger (1987)	chapter 9:	Statistical inference: Estimation, pp. 355-395.

V. References:

1976	Asher Herbert B.	<i>Causal Modeling</i>	Sage Publications, Beverly Hills
1985	Davis James A.	<i>The Logic of Causal Order</i>	Sage Publications, Beverly Hills
1975	Kim Jae-On, Kohout Frank, J.	Special Topics in general linear models	in: Nie Norman, H. et. al., <i>SPSS. Statistical Package for the Social Scientists</i> . Second Edition, pp. 368-397
1978a	Kim Jae-On, Mueller Charles W.	<i>Factor Analysis. Statistical Methods and Practical Issues</i>	Sage Publications, Beverly Hills
1978b	Kim Jae-On, Mueller Charles W.	<i>Factor Analysis. What it is and How To Do It</i>	Sage Publications, Beverly Hills
1987	Pfaffenberger C. Roger, Patterson H. James	<i>Statistical Methods for Bussines and Economics</i>	Irwin Homewood, Ill.,
1986	Schroeder Larry D., Sjoquist David L., Stepan Paula E.	<i>Understanding Regression Analysis. An Introductory Guide</i>	Sage Publications, Beverly Hills
1989	Słomczyński Kazimierz M.	<i>Social Structure and Mobility: Poland, Japan and the United States. Methodological Studies</i>	Polish Academy of Sciences, Institute of Philosophy and Sociology
2000	Inglehart, Ronald, et al.	<i>WORLD VALUES SURVEYS AND EUROPEAN VALUES SURVEYS, 1981-1984, 1990-1993, and 1995-1997</i>	[Computer file]. ICPSR version. Ann Arbor, MI: Institute for Social Research [producer], 2000.

VI. Report: general description

Report will have two parts: A and B. For each part the same data set will be used:

A. Scaling political attitude with a help of exploratory factor analysis

Scale selected attitude. Identify and justify its dimensions - interpret them. Build index (-es) based on results of factor analysis and investigate their properties, i.e. associations with factor scores obtained previously. Compare two countries selected for analysis in regard to all steps of scaling.

Main purpose of part A is to show how exploratory factor analysis can be employed in scaling political attitudes: checking unidimensionality (scalability) assumption, indicator (item) selection and justifying index construction.

From CSS survey data bank students will select two countries, full samples. Participants will select several (7-10) indicators of phenomenon (political attitude) to be scaled and will formulate hypotheses concerning its statistical associations with standard stratification variables. Hypotheses should point out differences between two countries in respect to these associations.

Before entering indicator variables into factor analysis their distributions will be checked, next indicators will be dichotomised.

Initial item selection will be based on results of exploratory factor analysis - set of items will be reduced until satisfying single-factor solution will be obtained. Factor scores added to working data set will be kept as a provisional scale assessment. Dichotomised indicators significantly correlated with it will form simple additive index.

Properties of factor score and additive index inspired by factor analysis will be investigated in the next part of report. Strong linear interdependence between two scales will validate index construction internally. Consistency of predicted and hypothesised associations between index and stratification variables will serve as an external validation of scaling procedure.

All steps mentioned above will be performed separately for each country. At the end differences and similarities between two societies under study will be discussed.

B. Modelling attitude formation process with a help of path model

Using scales (indexes) obtained in part A as a dependent phenomenon, compare path models of attitude formation in two countries.

Main purpose of part B is to show how simple multivariate regression tools can be applied to the modelling social processes.

Looking for social determinants of political attitude students will use set of standard stratification characteristics of respondents.

For each selected country causal hypothesis describing process of attitude crystallisation should be proposed and verified.

Models will be calculated separately for each country and then compared in regard to their parameters: goodness of fit, set of significant paths and direction of causal links.

At the end of that part differences and similarities between models of social processes determined for two societies under study will be discussed.

Remaining details on the report are enclosed in “**QuantitativeMethodsReportRequirements**” document.