<p style="text-align:center; color:red;">**DRAFT!**</p>

INTRODUCTION TO
STRUCTURAL EQUATIONS MODELING WITH LISREL

Univ-Prof. DDr. Adamantios Diamantopoulos

Chaired Professor of International Marketing, University of Vienna
Visiting Professor, FELU
adamantios.diamantopoulos@univie.ac.at
http://international-marketing.univie.ac.at/

Course Objectives

The purpose of this intensive course is to provide a user-friendly introduction to (covariance-based) structural equations modeling (SEM) using the LISREL program and the SIMPLIS command language. The course designed for non-experts and its emphasis is on understanding and applying SEM as a tool in substantive research. Its target audience includes doctoral students and academic researchers involved in quantitative modeling and data analysis. **Important:** *The course assumes prior knowledge of data analysis and multivariate statistics (including factor analysis and regression).*

Scope & Approach

The course seeks to familiarize participants with the various stages associated with conceptualizing, identifying, estimating, and evaluating structural equation models, highlighting key decisions and potential problems at each stage. Following an introduction of SEM as an analytical approach, issues associated with the theoretical specification and graphical representation of a full latent variable model are discussed. These set the background for applying the LISREL program to estimate the model and assess its fit along different criteria. Strategies for model modification and cross-validation are also outlined. To enable participants experience SEM "in action", the above issues are illustrated with a concrete example of a model estimated by the LISREL program. Detailed guidance for setting up and interpreting the relevant input/output files of the program is also provided.

Once course participants have become familiar with the basic principles of SEM and the use of the LISREL program, several different types of models will be illustrated, such as regression-type models, path analysis models, measurement models, and MIMIC models. In addition, various LISREL programming issues (e.g., fixing specific parameters, incorporating equality constraints, undertaking an effect decomposition) will be discussed.

The course will take the form of interactive workshop sessions, placing particular emphasis on student participation.

Participants are expected to download the (free) student version of the LISREL program from www.ssicentral.com and also read widely on the subject (see Course Text and Additional Readings below).

Topics

- Introduction to SEM
- Model Conceptualization I: Structure
- Model Conceptualization II: Measurement
- Path Diagram Construction
- Model Identification
- Introduction to the LISREL Program
- Parameter Estimation
- Model Fit Evaluation
- Model Modification
- Model Cross-Validation
- Examples of different types of SEM models

Course Text

The main textbook used in the course is:

Diamantopoulos, A. & Siguaw, J.A. 2000. *Introducing LISREL,* Sage Publications (ISBN 0-7619-5171).

Student should also read the relevant chapters on SEM in:

Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. 2010. *Multivariate Data Analysis*, 7th edition, Pearson (ISBN 978-0-13-515309-3).

Additional Readings

Anderson, J. C. & Gerbing, D. W. 1988. Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, 103(3): 411-423.

Bagozzi, R. P. & Yi, Y. 1988. On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science*, 16(1): 74-94.

Bagozzi, R. P. & Yi, Y. 2012. Specification, Evaluation, and Interpretation of Structural Equation Models. *Journal of the Academy of Marketing Science*, 40(1): 8-34.

Baumgartner, H. & Homburg, C. 1996. Applications of Structural Equation Modeling in Marketing and Consumer Research. A Review. *International Journal of Research in Marketing,* 13(2): 139-161.

Chin, W. W., Peterson, R. A. & Brown, S. P. 2008. Structural Equation Modeling in Marketing: Some Practical Reminders, *Journal of Marketing Theory and Practice*, 16(4): 287-298.

Danes, J.E. & Mann, K.O. 1984. Unidimensional Measurement and Structural Equation Models with Latent Variables. *Journal of Business Research,* 12(3): 337-352.

Diamantopoulos, A. & Winklhofer, H. 2001. Index Construction with Formative Indicators: An Alternative to Scale Development. *Journal of Marketing Research,* 38(2): 269-277.

Gefen, D., Straub, D. W. & Boudreau, M-C. 2000. Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, 4(1): 1-79.

Golob, T. F. 2003. Structural Equation Modeling for Travel Behavior Research. *Transportation Research Part B: Methodological*, 37(1): 1-25.

Iacobucci, D. 2009. Everything You Always Wanted to Know about SEM (Structural Equations Modeling) but were Afraid to Ask. *Journal of Consumer Psychology*, 19(4): 673-680.

Iacobucci, D. 2010. Structural Equations Modeling: Fit Indices, Sample Size, and Advanced Topics. *Journal of Consumer Psychology*, 20(1): 90-98.

MacCallum, R. C. & Austin, J. T. 2000. Applications of Structural Equation Modeling in Psychological Research. *Annual Review of Psychology*, 51(1): 201-226.

Mackenzie, S. B. 2001. Opportunities for Improving Consumer Research through Latent Variable Structural Equation Modeling. *Journal of Consumer Research*, 28(1): 159-166.

Reisinger, Y. & Turner, L. 1999. Structural Equation Modelling with LISREL: Application to Tourism. *Tourism Management*, 20(1): 71-88.

Schreiber, J. B., Stage, F. K., King, J., Vora, A. & Barlow, E. A. 2006. Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Education Research*, 99(6): 323-338.

Shah, R. & Goldstein, S. M. 2006. Use of Structural Equation Models in Operations Management Research: Looking Back and Forward. *Journal of Operations Management*, 24(2): 148-169.

Shook, C. L., Ketchen, D. J., Hult., G. T. M & Kacmar, M. 2004. An Assessment of the Use of Structural Equation Modeling in Strategic Management Research. *Strategic Management Journal*, 25(4): 397-404.

Steenkamp, J. B. E. M. & Baumgartner, H. 2000. On the Use of Structural Equation Models for Marketing Modeling. *International Journal of Research in Marketing*, 17(2-3): 195-202.

Tomarken, A. J. & Waller, N. G. 2005. Structural Equation Modeling: Strengths, Limitations, and Misconceptions. *Annual Review of Clinical Psychology*, 1: 31-65.

Williams, L. J., Edwards, J. R. & Vandenberg, R. J. 2003. Recent Advances in Causal Modeling Methods for Organizational and Management Research. *Journal of Management*, 29(6): 903-936.

Useful Websites

- David Kenny's homepage (http://davidkenny.net/cm/causalm.htm) is a gateway to tutorials on avariety of SEM topics.

- Jason Newsom's homepage (www.upa.pdx.edu/IOA/newsom) has a comprehensive collection of books and articles on practically every aspect of SEM.

- Ed Rigdon´s homepage (www.gsu.edu/~mkteer/index.html) is a treasure grove of online resources on SEM.

Instructor

Univ-Prof. DDr. Adamantios Diamantopoulos holds the Chair of International Marketing at the University of Vienna, Austria. He is also Visiting Professor at the University of Ljubljana, Slovenia, Visiting Research Professor at Loughborough University, UK, and Senior Fellow at the Dr. Theo and Friedl Schoeller Research Center for Business & Society, Nuremburg, Germany. During the academic year 2012/13, he was the "*Joseph A. Schumpeter Fellow*" at Harvard University. His main research interests are in international marketing and research methodology, and he is the author of some 200 publications in these areas. His work has appeared, among others, in the *Journal of Marketing Research*, *Journal of International Business Studies*, *Journal of the Academy of Marketing Science*, *International Journal of Research in Marketing*, *Journal of Service Research*, *Journal of International Marketing*, *Journal of Retailing*, *MIS Quarterly, Organizational Research Methods, Psychological Methods, Information Systems Research,* and *Journal of Business Research*. He has been the recipient of several Best Paper Awards, the most recent being the 2013 Hans B. Thorelli Award for the article published in *Journal of International Marketing* that has made the most significant and long-term contribution to international marketing theory or practice. He sits on the Editorial Review Boards of a dozen academic journals, and acts as a referee for several professional associations and funding bodies. In 2000, he was elected Fellow of the British Academy of Management and in 2013 Fellow of the European Marketing Academy. In the research performance rankings by the *Handelsblatt* newspaper (2009, 2012, 2014), he has been consistently ranked #4 in terms of "Lifetime Achievement" among all business administration academics in Germany, Austria and Switzerland.