

Partial Least Squares Structural Equations Modeling (PLS-SEM) Research Methods Workshop, pre-AIB-UKI conference @ Manchester 2015

13-15 April 2015 (Monday-Wednesday)

The University of Manchester, Manchester Business School

Oxford Road, Manchester M15 6PB, UK

Room: TBC

Registration: <http://manchester2015.pls-school.com>

Sponsors



1 Instructors

Prof. Dr. Jörg Henseler

Professor of Product-Market Relations

University of Twente, the Netherlands

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and Universidade Nova de Lisboa (Portugal)

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Visiting Professor to the Faculty of Business and Law

2 Course objectives

With an increase in methodological sophistication, quantitative research methods and particularly methods based on the structural equation modeling (SEM) family of techniques have become ever more popular. However, despite an increasing adoption of SEM for research and publication, the methodology is often misused, wrongly applied or simply poorly executed. This implies that there is a necessity to educate PhD researchers both about the conceptual foundations and practical implementation issues.

This three-day seminar introduces participants to the state-of-the-art of PLS-SEM using SmartPLS 3. The first two days of the seminar provide a profound introduction to PLS-SEM. Participants will learn how to apply PLS-SEM by means of the SmartPLS software. The instructors will make use of several SmartPLS examples and exercises. The starting at the second day and continuing on the third day, the seminar covers extensions and new developments to PLS-SEM, such as

- Mediating effects,
- Moderating effects (interaction effects),
- Multigroup analysis (including measurement invariance testing),

- Higher-order constructs
- Consistent PLS (PLSc) to estimate common factor models within the PLS-SEM framework
- Overall goodness of fit: the SRMR for composites and common factor models
- A new criterion for discriminant validity: The heterotrait-monotrait ratio of correlations (HTMT)
- New segmentation tools, such as PLS-GAS and PLS-POS
- Measurement invariance in composite models (MICOM)

Participants will learn how to apply these extensions to PLS-SEM. Practical applications and the use of the SmartPLS software application are an integral part of this course.

3 Learning outcomes

This workshop is designed to familiarize with the potentials of using the multivariate analysis method PLS-SEM in international business research. The objectives of this course are to provide an in-depth methodological introduction into the PLS-SEM approach (the nature of causal modeling, analytical objectives, some statistics), (2) the evaluation of measurement results, and (3) complementary analytical techniques.

This course will also provide real examples of how SmartPLS works so that students can learn the software and practice during the course. At the end of the course, it is expected that students will be able to accurately run any basic PLS-SEM applications and some extensions as required for studies and journal publications. This is an introductory course; therefore more advanced topics will be suggested by the instructors with suitable literature but may not be covered in depth.

This course has been designed for full-time faculty and PhD students who are interested in learning how to use the PLS-SEM method in their own research applications. A basic knowledge of multivariate statistics and SEM techniques is helpful, but not required.

4 Teaching and learning methods

The course is in its entirety based on software tutorials. In this way, participants obtain a strong methodological back ground as well as practical training.

- Presentations: The session will cover theory and its application.
- Computer exercises: Specifically, theoretical explanations underlying the software procedures and practical exercises where students will apply their learning to real-world examples provided by the instructor.
- There is also an opportunity to submit an essay/short paper that involves SmartPLS methodology and receive feedback on it. The results of the software estimation should be presented in a way that mirrors expectations from actual academic journals.

5 Registration and practical issues

- Cost: A fee of £499.00 applies for this three-day seminar. The fee covers the participation in the seminar, handouts, and a 30-day fully functional version of SmartPLS 3.
- Places are limited (maximum of 40 participants).
- Course registration and payment: <http://manchester2015.pls-school.com>
- Bring your laptop computer and a 2 or 3-way power extension lead.
- Download and install the SmartPLS software from <http://www.smartpls.com/> before coming to the workshop.

6 Teaching resources

In recent years, the literature on PLS has increased tremendously. In order to get an overview, we recommend the Handbook of Partial Least Squares and the Primer on PLS-SEM

Esposito Vinzi, Vincenzo, Wynne W. Chin, Joerg Henseler, and Huiwen Wang (2006), *Handbook of PLS and marketing*. Berlin: Springer. (DOI: 10.1007/978-3-540-32827-8).

Hair, Joseph F., G. Tomas M. Hult, Christian Ringle, and Marko Sarstedt (2013), *A primer on partial least squares structural equations modeling (PLS-SEM)*. London: Sage Publications.

*In our seminars, we present and discuss scholarly articles on PLS. The following are freely available (open access)*¹:

Dijkstra, Theo K. and Jörg Henseler (2015), "Consistent and asymptotically normal PLS estimators for linear structural equations," *Computational Statistics & Data Analysis*, 81 (0), 10-23. (DOI: 10.1016/j.csda.2014.07.008).

Hair, Joe F., Christian M. Ringle, and Marko Sarstedt (2011), "PLS-sem: Indeed a silver bullet," *Journal of Marketing Theory & Practice*, 19 (2), 139-152. (DOI: 10.2753/mtp1069-6679190202).

Hair, Joe, Marko Sarstedt, Christian Ringle, and Jeannette Mena (2012), "An assessment of the use of partial least squares structural equation modeling in marketing research," *Journal of the Academy of Marketing Science*, 40 (3), 414-433. (DOI: 10.1007/s11747-011-0261-6).

Henseler, Jörg (2010), "On the convergence of the partial least squares path modeling algorithm," *Computational Statistics*, 25 (1), 107-120. (DOI: 10.1007/s00180-009-0164-x).

Henseler, Jörg, Theo K. Dijkstra, Marko Sarstedt, Christian M. Ringle, Adamantios Diamantopoulos, Detmar W. Straub, David J. Ketchen, Joseph F. Hair, G. Tomas M. Hult, and Roger J. Calantone (2014), "Common beliefs and reality about PLS: Comments on Rönkkö and Evermann (2013)," *Organizational Research Methods*, 17 (2), 182-209. (DOI: 10.1177/1094428114526928).

Henseler, Jörg, Christian M Ringle, and Marko Sarstedt (2014), "A new criterion for assessing discriminant validity in variance-based structural equation modeling," *Journal of the Academy of Marketing Science*, forthcoming, 1-21. (DOI: 10.1007/s11747-014-0403-8).

Henseler, Jörg, Christian M. Ringle, and Rudolf R. Sinkovics (2009), "The use of partial least squares path modeling in international marketing," in *Advances in international marketing*, Rudolf R. Sinkovics and Pervez N. Ghauri (Eds.). *Advances in international marketing* Vol. 20. Bingley: Emerald JAI Press, 277-319. (DOI: 10.1108/S1474-7979(2009)0000020014). <https://www.escholar.manchester.ac.uk/uk-ac-man-scw:89555>

Henseler, Jörg and Marko Sarstedt (2013), "Goodness-of-fit indices for partial least squares path modeling," *Computational Statistics*, 28 (2), 565-580. (DOI: 10.1007/s00180-012-0317-1).

Ringle, Christian M, Marko Sarstedt, and Detmar W Straub (2012), "Editor's comments: A critical look at the use of PLS-sem in MIS quarterly," *MIS quarterly*, 36 (1), iii-xiv. <http://misq.org/skin/frontend/default/misq/pdf/V36I1/EdCommentsV36N1.pdf>

Sarstedt, Marko, Jan-Michael Becker, Christian M. Ringle, and Manfred Schwaiger (2011), "Uncovering and treating unobserved heterogeneity with fimix-pls: Which model selection criterion provides an appropriate number of segments?," *Schmalenbach Business Review*, 63 (1), 34-62. http://www.sbr-online.de/pdfarchive/einzelne_pdf/sbr_2011_jan_034-062.pdf

¹ A digital object identifier (DOI) is a unique alphanumeric string assigned by the International DOI Foundation registration agency to identify content and provide a persistent link to its location on the Internet. All DOI numbers begin with a 10 and contain a prefix and a suffix separated by a slash. To resolve a DOI and thus directly link to the relevant document, append the DOI name, e.g., 10.1016/j.ibusrev.2014.04.001, to the URL <http://dx.doi.org/> (Be sure to enter all of the characters before and after the slash. Do not include extra characters, or sentence punctuation marks. In this example this is: <http://dx.doi.org/10.1016/j.ibusrev.2014.04.001>

The above noted paper by Henseler, Ringle, and Sinkovics (2009) is an introduction to PLS and can serve for instance as a preparation for one of our seminars. Finally, we have selected some technical and applied papers that we regard as particularly worth reading:

- Becker, Jan-Michael, Arun Rai, Christian M. Ringle, and Franziska Völckner (2013), "Discovering unobserved heterogeneity in structural equation models to avert validity threats," *MIS Quarterly*, 37 (3), 665-694. <http://pls-institute.org/uploads/Becker2013MISQ.pdf>
- Henseler, Jörg and Wynne W. Chin (2010), "A comparison of approaches for the analysis of interaction effects between latent variables using partial least squares path modeling," *Structural Equation Modeling: A Multidisciplinary Journal*, 17 (1), 82-109. (DOI: 10.1080/10705510903439003).
- Henseler, Jörg, Georg Fassott, Theo K. Dijkstra, and Bradley Wilson (2012), "Analysing quadratic effects of formative constructs by means of variance-based structural equation modelling[dagger]," *European Journal of Information Systems*, 21 (1), 99-112. (DOI: 10.1057/ejis.2011.36).
- Reinartz, Werner, Michael Haenlein, and Jörg Henseler (2009), "An empirical comparison of the efficacy of covariance-based and variance-based sem," *International Journal of Research in Marketing*, 26 (4), 332-344. (DOI: 10.1016/j.ijresmar.2009.08.001).
- Rigdon, Edward E., Christian M. Ringle, and Marko Sarstedt (2010), "Structural modeling of heterogeneous data with partial least squares," in *Review of marketing research*, Naresh K. Malhotra (Ed.) Vol. 7. Bingley, UK: Emerald Group Publishing Limited, 255-296. (DOI: 10.1108/S1548-6435(2010)0000007011).
- Sarstedt, Marko and Christian M. Ringle (2010), "Treating unobserved heterogeneity in PLS path modeling: A comparison of fimix-PLS with different data analysis strategies," *Journal of Applied Statistics*, 37 (8), 1299-1318. (DOI: 10.1080/02664760903030213).
- Sarstedt, Marko, Christian M. Ringle, Jörg Henseler, and Joseph F. Hair (2014), "On the emancipation of PLS-sem: A commentary on rigdon (2012)," *Long Range Planning*, 47 (3), 154-160. (DOI: 10.1016/j.lrp.2014.02.007).

7 Schedule (13-15 April 2015, Monday-Wednesday, 9:30-17:30 daily)

- Location: The University of Manchester
- Room: Renold Building F3

Date	Time	Content
Monday 13 Apr 2015	09:00 - 10:30	Foundations of structural equation modeling and introduction to PLS-SEM
	11:00 - 12:30	Creating valid PLS path models; software tutorial
	14:00 - 15:30	Model estimation and assessing measurement models; software tutorial
	16:00 - 17:30	Assessing structural models; software tutorial
Tuesday 14 Apr 2015	09:00 - 10:30	Bootstrapping, Blindfolding; software tutorial
	11:00 - 12:30	Importance-performance matrix; software tutorial
	14:00 - 15:30	Unobserved heterogeneity: PLS-GAS & PLS-POS; software tutorial
	16:00 - 17:30	Observed heterogeneity: multigroup analysis; software tutorial
Wednesday 15 Apr 2015	09:00 - 10:30	Measurement model invariance; software tutorial
	11:00 - 12:30	Moderation; software tutorial
	14:00 - 15:30	Mediation; software tutorial
	16:00 - 17:30	Higher-order constructs; software tutorial

8 Instructor's short bio

Jörg Henseler is a Professor of Product-Market Relations at the Department of Design, Production and Management, Faculty of Engineering Technology at the University of Twente (The Netherlands) and Visiting Professor at the Higher Institute of Statistics and Information Management (ISEGI), Universidade Nova de Lisboa (Portugal). He has published in scholarly journals such as *Computational Statistics & Data Analysis (CSDA)*, *European Journal of Information Systems (EJIS)*, *International Journal of Research in Marketing (IJRM)*, *Journal of the Academy of Marketing Science (JAMS)*, *Long Range Planning (LRP)*, *MIS Quarterly (MISQ)*, *Organizational Research Methods (ORM)*, and *Structural Equation Modeling – An Interdisciplinary Journal (SEM)*, and he is editor of the Handbook of Partial Least Squares (published by Springer). He chairs the scientific advisory board of ADANCO, a variance-based structural equation modeling software.

Christian M. Ringle is a Professor of Management and the Director of the Institute for Human Resource Management and Organizations at the Hamburg University of Technology (TUHH) and Visiting Professor at the Faculty of Business, and Law Professor at the University of Newcastle (Australia). His research has been published in well-known journals such as *Information Systems Research (ISR)*, *International Journal of Research in Marketing (IJRM)*, *Journal of Business Research (JBR)*, *Journal of Marketing Theory and Practice (JMTP)*, *Journal of Service Research (JSR)*, *Journal of the Academy of Marketing Science (JAMS)*, *Long Range Planning (LRP)*, *MIS Quarterly (MISQ)*, and *Organizational Research Methods (ORM)*. Dr. Ringle co-authored the textbook on PLS-SEM and is co-founder of SmartPLS, a software tool with a graphical user interface for the application of the PLS-SEM method. More information: <http://www.tuhh.de/hrmo/team/prof-dr-c-m-ringle.html>.

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