



## PhD Course

# VAR modeling with applications in Marketing

**November 20-22, 2014**

**Esplanade 36, 20354 Hamburg, 5th Floor, Room 5007**

**Course instructor:** Professor Koen Pauwels

**Course Value:** 2 SWS or 4 LPs

### Course overview:

This is well-taught 3-day PhD course (2 SWS) in modern time series analysis, with special attention to dynamic systems of equations such as Vector Autoregressive and Vector error Correction models and model testing/validation.

By the end of the course, the PhD candidate will have a strong basis in 3 skills:

- 1) **How to design a dynamic system model from a real-life marketing problem**
- 2) **How to specify and estimate the appropriate model in Eviews software**
- 3) **How to communicate and publish with dynamic system models**

Recognizing the varying prior exposure to mathematical modelling and coding, this course offers both, a conceptual an overview of time series models, and hands-on experience in specifying and estimating models with a point-and-click interface (see 'course software'). The program codes will be provided by the instructor.

### How to Register:

Please email Doris Bombeck **until Oct 31, 2014**

([doris.bombeck@wiso.uni-hamburg.de](mailto:doris.bombeck@wiso.uni-hamburg.de))

Please remember that places are restricted and will be allocated in order of received registrations.

### Course software:

Eviews 8 (or 7, or 6), are available for FREE for all PhD students from WISO-IT given that you are in possession of a WISO-Domain account and member of the faculty (BWL/WISO).



**Course Book:**

“It’s not the Size of the Data – It’s How You Use It: Smarter Marketing with Analytics and Dashboards” by Koen Pauwels

**Course Evaluation:**

The instructor will assess the students based on the following:

40% based on the 2 individual assignments (20% each)

35% based on the final group assignment 3

25% based on overall course participation

Grading will be “passed/failed” (no grades)

## Course schedule and assignments:

**PRIOR** to Course:

### **Readings:**

1. "Introduction: Decisions that Data and Analytics can Inform" in textbook
2. "Chapter 1: Marketing Analytics Dashboards (MAD): what, why, who and how?" in textbook
3. "Ch 10: Emerging Market Frontier: Metrics across Countries"
4. Lehmann, D. R. (2004), "Metrics for Making Marketing Matter", *Journal of Marketing*, 68 (4), 73-75.
5. Wiesel, T., K. Pauwels and J. Arts (2011), "Marketing's Profit Impact: Quantifying Online and Offline Funnel Progression", *Marketing Science*.

### **Assignment 1:**

After reading through the assigned articles, think about a problem that involves dynamics in marketing. What do you need to find out (data, constraints, ...) to address this problem? What type of model may be appropriate?

**Address these questions in a 3- page write-up.** This write-up consists of the title, abstract and 2-page introduction for your paper-to-be. The abstract should grab attention and justify why anyone would want to invest the time reading your paper. You also may, but do not have to, speculate on what you will find and how this is relevant to marketing researchers and managers. The introduction should clarify why the general research area is important and how your paper contributes to the existing knowledge. Clearly state the research question and how you will address it.



**Nov 20, Day 1: Addressing Dynamic Problems in Marketing**  
**(early afternoon)**

***Readings:***

6. “Chapter 8: Eliminate to select Key Leading Performance Indicators” in textbook
7. Dekimpe, M and D.M. Hanssens “Sustained Marketing and Persistent Response: A new look at long-term marketing profitability,” *Journal of Marketing Research*, 36 (November), 1999: 397-401 (first half of article)
8. Eviews Tutorial:”tutorialgettingstartedeviewspauwels.doc”
9. Case: Lydia Pinkham (pinkhamadvertisingsales.xls)

**Part I: Refresher on Dynamic Regression**

*Case: Lydia Pinkham (pinkhamadvertisingsales.xls)*

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**Nov 21, Day 2: Specifying Dynamic System Models:  
Performance Stationarity and Evolution**

***Readings:***

10. Simon, H (1997), "Hysteresis in Marketing: A New Phenomenon?," Sloan Management Review, 38 (3), 39-50.
11. Baghestani, H. (1991), "Cointegration Analysis of the Advertising-Sales Relationship", The Journal of Industrial Economics, 39(6), 671-680.
12. Part II: "Test for Unit Roots, ..." in "eviewspauwelsregressionvarvec.doc"

***Content:***

We consider the different strategic scenarios for marketing and performance: business-as-usual, hysteresis, escalation and evolving business and apply these to the Lydia Pinkham case.

***Assignment 2:***

In the Lydia Pinkham data, what is the dynamic relation among sales and advertising?

- 1) What can you tell from plotting both variables over time?
- 2) Which variable (Granger) causes another variable?
- 3) Are sales and advertising stationary or evolving?
- 4) Which factors do you believe affect sales?
- 5) Which factors do you believe affect advertising?

**To be handed in as a 1-3 page write up before the start of class  
(from previous day)**

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## **Nov 22, Day 3: Estimation and Interpretation of VAR Models in Marketing**

### ***Readings:***

13. Dekimpe, M. And D. M. Hanssens (1999), “Sustained Marketing and Persistent Response: A new look at long-term marketing profitability,” *Journal of Marketing Research*, 36 (November), 401-412.
14. Part III: “Dynamic System Models: VAR & VEC” in “[eviewspauwelsregressionvarvec.doc](#)”
15. Case: Sales effectiveness of sales promotions for beer ([beergroningen.wf1](#))

### ***Content:***

A key question for marketers is: what happens to performance if I change marketing actions?.

Therefore, such ‘what-if’ analysis is necessary to enable the use of dynamic model findings – and is also known as the fourth stage in dashboard development. Within our modelling approach, impulse response functions track the over-time performance impact of a change to marketing, accounting for the full dynamic system. Interpretation of these impulse response functions is often a challenge, as we discuss today. Moreover, testing and validating the model, its predictions, and policy recommendations is important to both marketing academia and practitioners. We apply this to a fast moving consumer good (beer) and a business-to-business market with offline and online marketing activities. Finally, we discuss forecast error variance decomposition (FEVD) and consider extensions of the standard dynamic system models, including rolling window tests and solving for a target variable.

### ***Final Assignment 3:***

Together with 2-3 team members (which we will form in day 1), calculate the over-time elasticity of sales performance to retail price, feature and display in the beer category.

We will assign on day 2 the brand from whose perspective you are performing the analysis. What can you conclude about the effectiveness of these marketing actions?

**This assignment should be 3-5 pages of main text, and you can add as many appendices as you like.**

This concluding assignment assesses your understanding and application of the course material, so I will give you sufficient time to digest the material and complete your answer. We will agree on a deadline in class, you will email the assignment to me afterwards.