Introduction

PD Dr. Ralf Stecking and **Abigail Opokua Asare**

Department of Business Adminstration,
Economics and Law

Institute of Economics
Carl von Ossietzky University Oldenburg

14 October, 2025

Willkommen

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Course Arrangements

This course consists of **4 contact hours per week**:

- Lecture: Tuesdays, 16:00-18:00, in A05 0-055
- Practical Exercises: Thursdays, 12:00-14:00, in A05 1-161
  - Provides hands-on practice with theoretical concepts from the lecture using `RStudio`.
  - The first session will be held on **Thursday, 16 October 2025**.

Course Materials

All course materials can be accessed via:

- StudIP: Lecture slides (from next week), announcements, problem sets, data sets, and additional information.

✉ abigail.asare@uol.de

- Office Hours: Mondays 10:00-12:00 (please email in advance).
- Room: A05-0-071

Course overview/ winter term 2025/26

Date	No.	Lecture (Tue 16-18)
14 Oct.	1	Introduction
21 Oct.	2	Time series and its components
28 Oct.	3	Regression analysis for trend and smooth component
04 Nov.	4	Moving averages + Exponential smoothing
11 Nov.	5	Constant additive and multiplicative season figures
18 Nov.	6	Multivariate forecasting: Multiple regression I/II
25 Nov.	7	**No Lecture**
02 Dec.	8	**No Lecture**
09 Dec.	9	Stationarity of time series / AR+MA processes
16 Dec.	10	Box-Jenkins approach I/II
		Christmas holidays
06 Jan.	11	**No Lecture**
13 Jan.	12	Box-Jenkins approach III / Error measures of the forecast
20 Jan.	13	Logistic regression for credit scoring
27 Jan.	14	Revision

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English Sources:

- Abraham, B. and Ledolter, J. (2005): Statistical Methods for Forecasting, New York
- Box, G.E.P and Jenkins, G.M. (1976): Time series analysis: forecasting and control, San Francisco
- Hamilton, J.D. (1994): Time series analysis, Princeton NJ
- Hyndman, R.J. and Athanasopoulos, G. (2021): Forecasting: principles and pratice, 3rd edition, OTexts: Melbourne, Australia. https://otexts.com/fpp3/
- Chang, W. (2018): R Graphics Cookbook. O'Reilly Media, Inc. https://r-graphics.org/
- Grolemund, G. (2014): Hands-On Programming with R: Write Your Own Function and Simulations. O'Reilly Media, Inc. https://rstudio-education.github.io/hopr/
- Makridakis, S., Wheelwright, S.C., MacGee, V.E. (1983): Forecasting: methods and applications, New York Venables, W. N., and Smith, D. M. (2010): An Introduction to R. https://cran.r-project.org/doc/manuals/rrelease/R-intro.pdf
- Wickham, H., and Grolemund, G. (2017): R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. O'Reilly Media, Inc. https://r4ds.had.co.nz/

German Sources:

- Kreiß, J.-P. und Neuhaus, G. (2006): Einführung in die Zeitreihenanalyse, Berlin
- Neusser, K. (2011): Zeitreihenanalyse in den Wirtschaftswissenschaften, 3. Aufl., Wiesbaden
- Schira, J. (2016): Statistische Methoden der VWL und BWL, 5. Aufl., München
- Schlittgen, R. und Streitberg, B.H.J. (2001): Zeitreihenanalyse, München
- Schlittgen, R. (2001): Angewandte Zeitreihenanalyse, München
- Thome, H. (2005): Zeitreihenanalyse, München

Definition I

- ✓ Forecasting is the process of providing information about expected effects and developments. In other words, it is the prediction of future events.
- ✓ Forecasting could be short, medium or long-term.
- ✓ Who forecasts and why?
- ✓ Complexities of Forecasting:
  - How much data exists?
  - What is the required forecasting time horizon?
  - Are forecasts expected to be adaptive over time?
  - Frequency
  - Outliers
  - Missing
  - .....

Definition II

- Time series analysis vs. forecasting (prediction)
- Qualitative vs. Quantitative methods
  - Qualitative methods (little or no historical data):
    - Expert consultation (subjective judgment)
    - Indicator/bellwether methods
  - Quantitative methods (data-driven): There are three well know basic approaches to generating forecasting:
    - Regression based
    - Smoothing methods and
    - General time series models.

Regression model

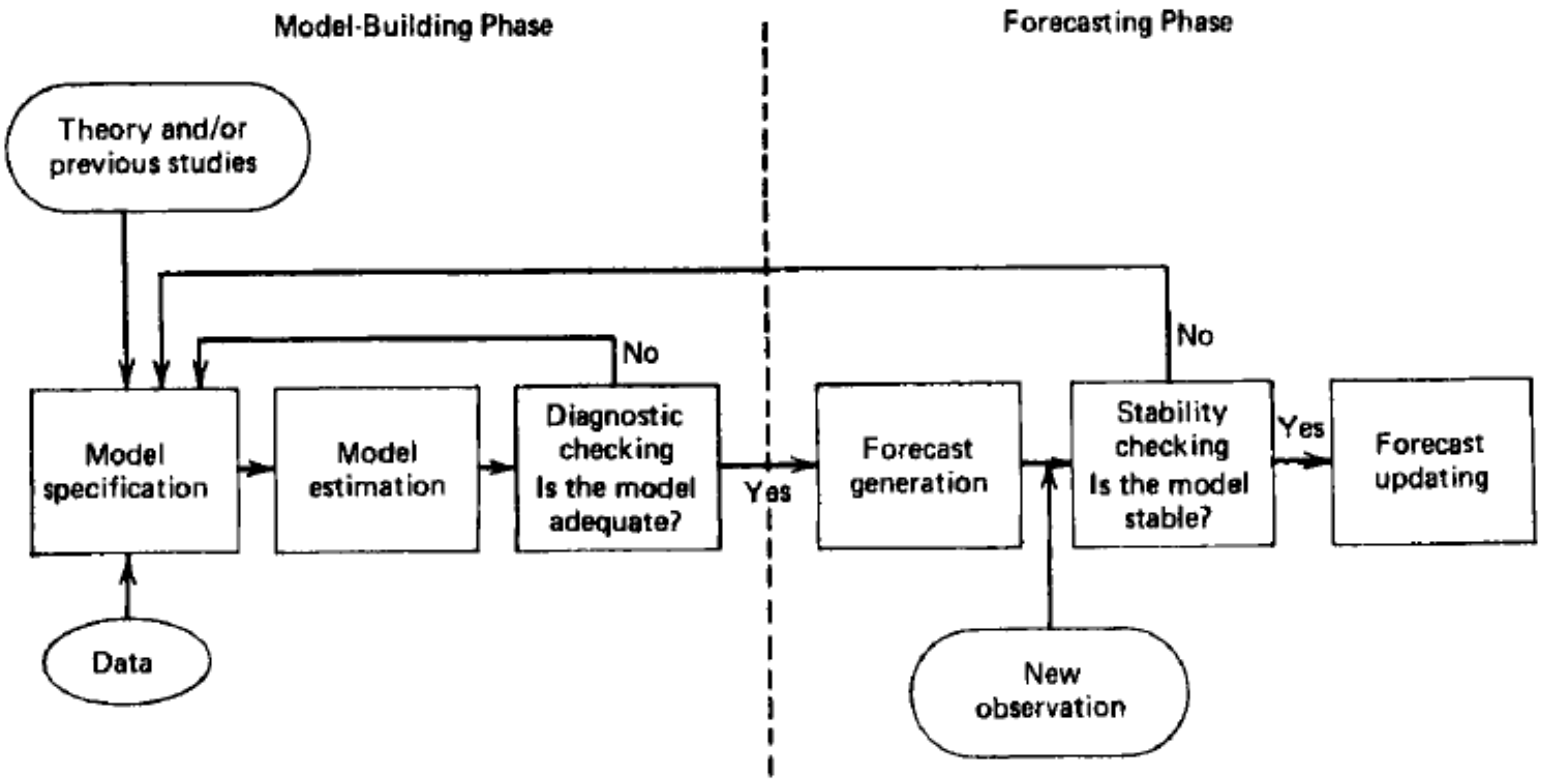
- Regression model as "basic model" for quantitative (multivariate) forecasting methods.
- Relationship between *one* dependent and *one* or *more* independent variables or time series:
  - Techniques:
    1. Linear regression

$$\hat{y} = \beta_0 + \beta_1 x_1 + ... + \beta_J x_J$$

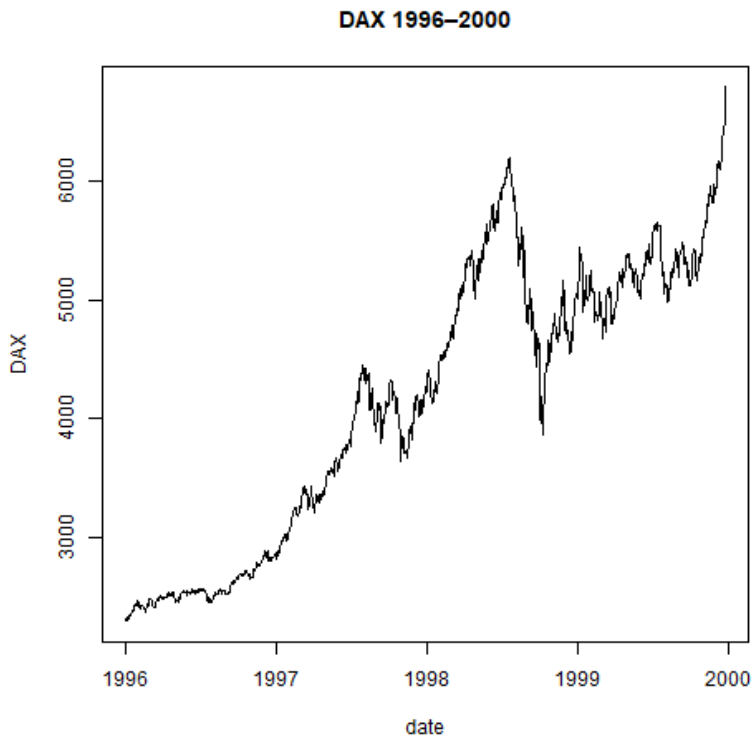
    2. Logistic regression

$$P(y = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + ... + \beta_J x_J)}}$$

Forecasting framework



DAX 1996-2000



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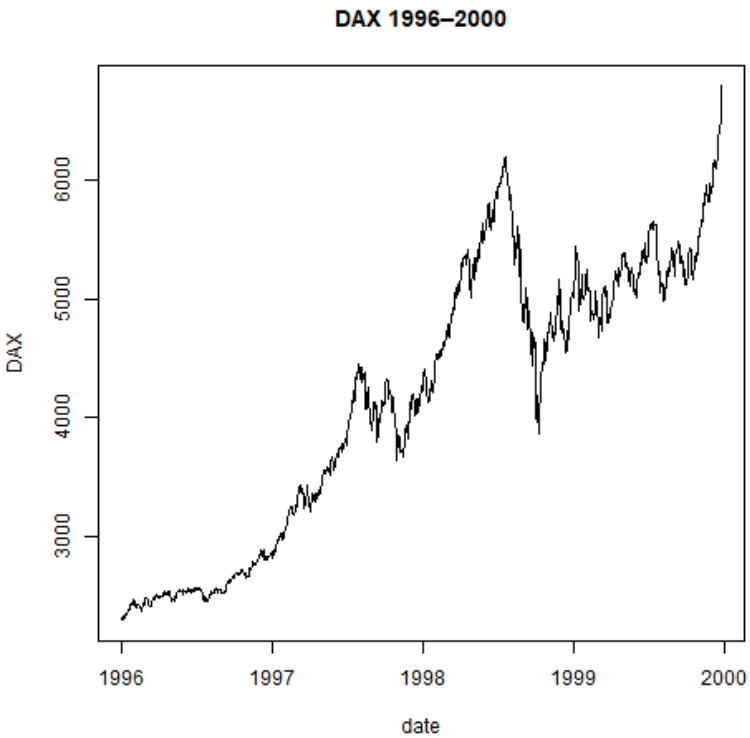

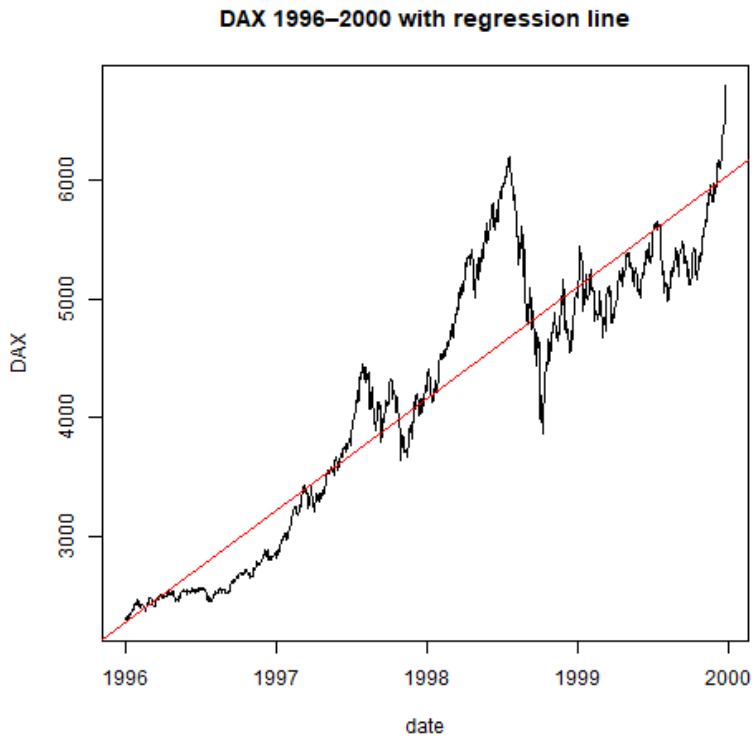

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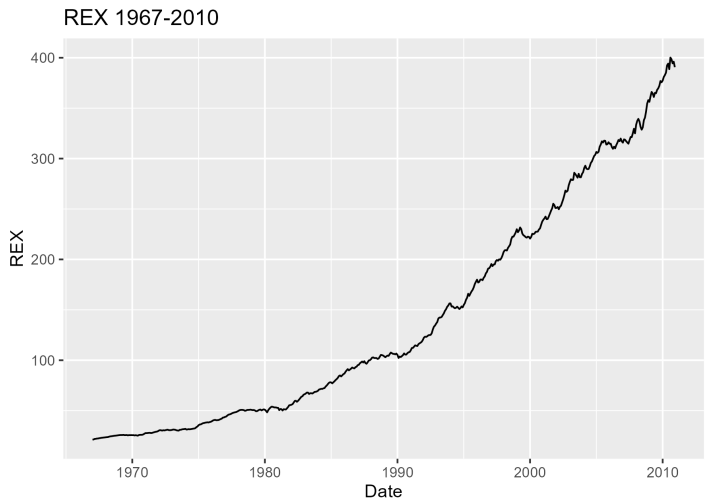
REX 1967-2010



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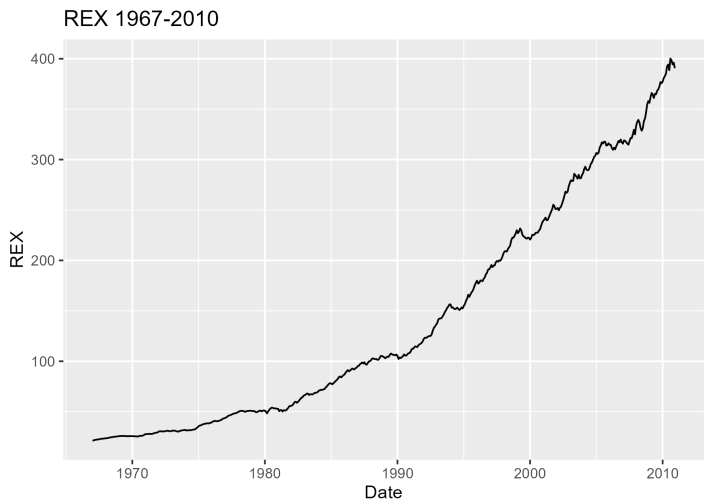

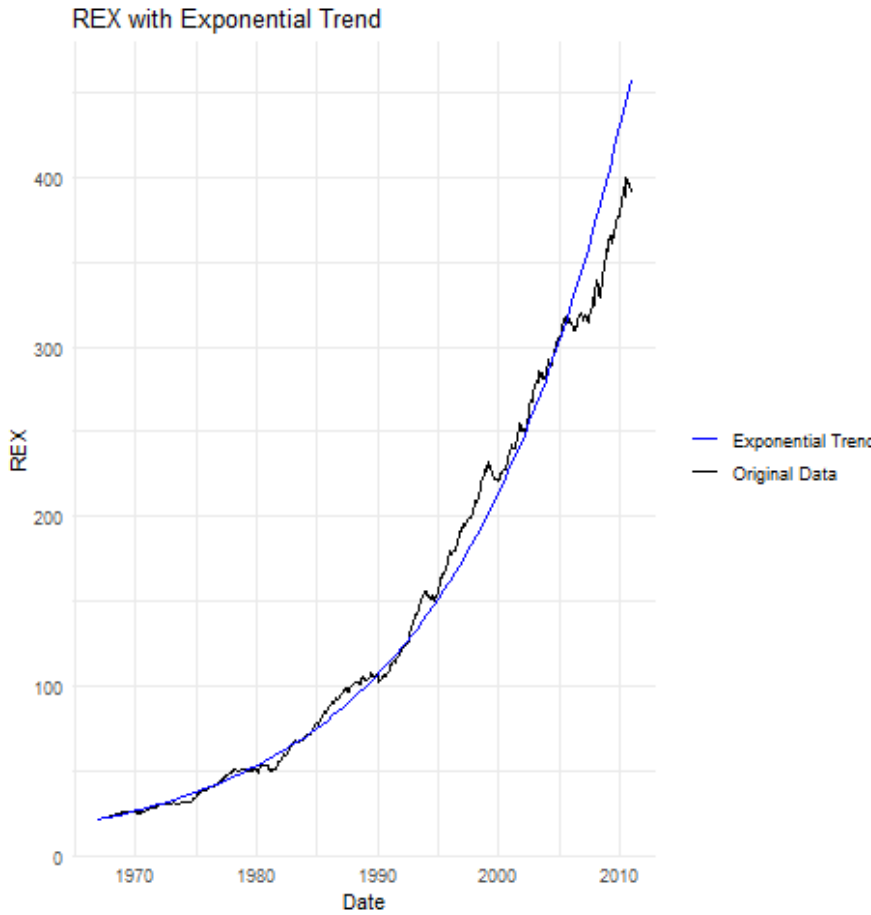

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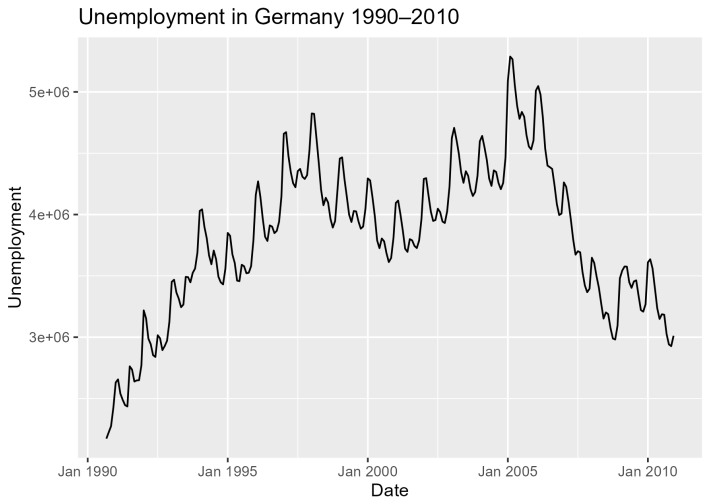
Unemployment data 1990-2010



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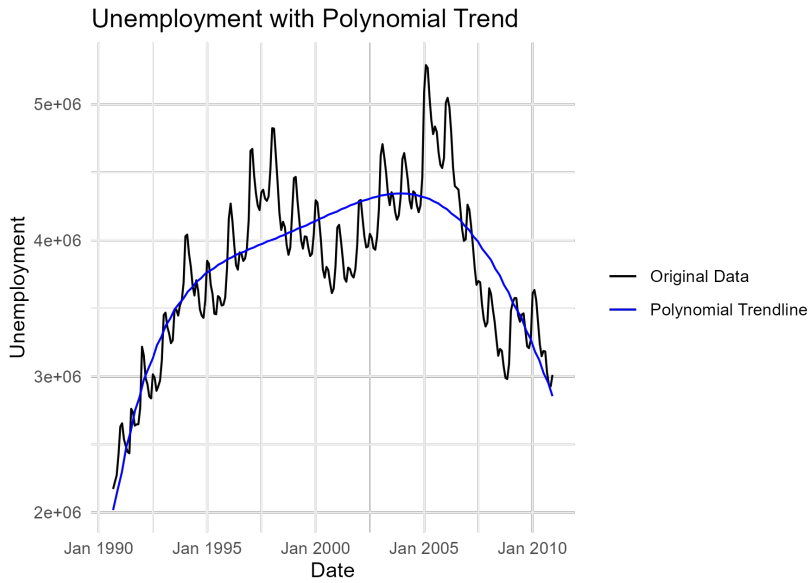
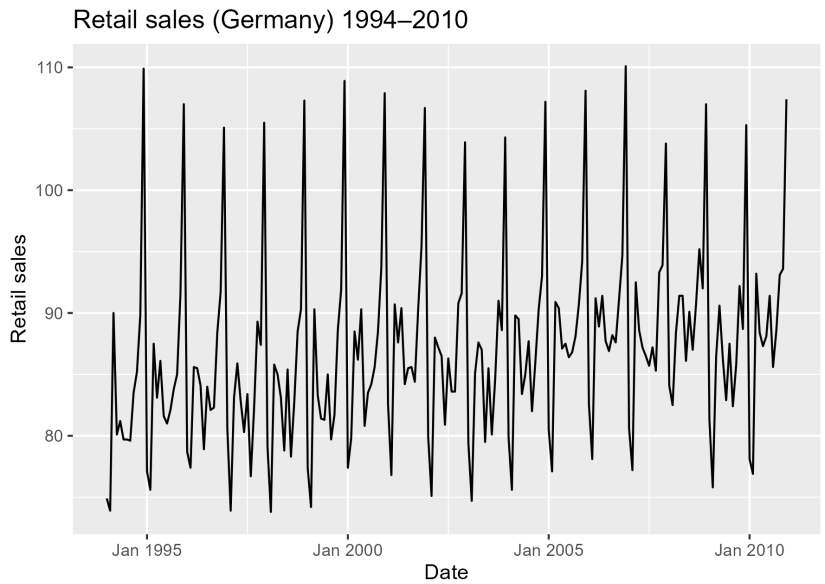


Retail sales (Germany)



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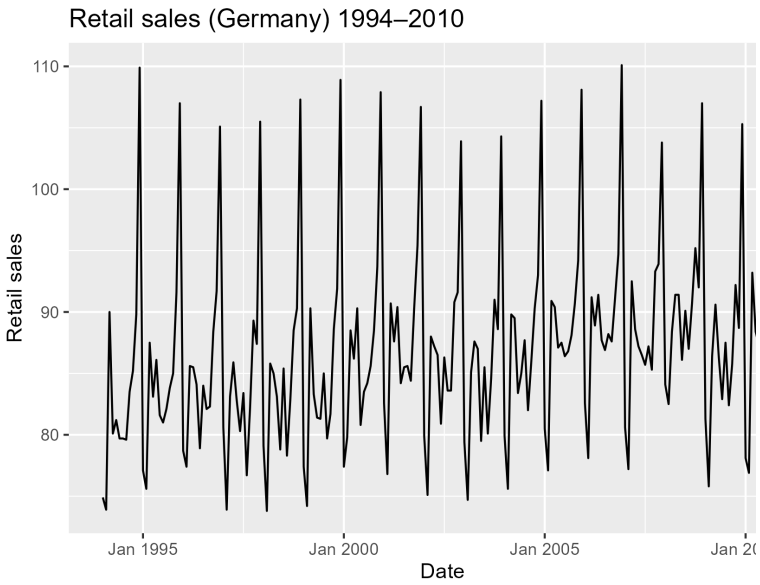
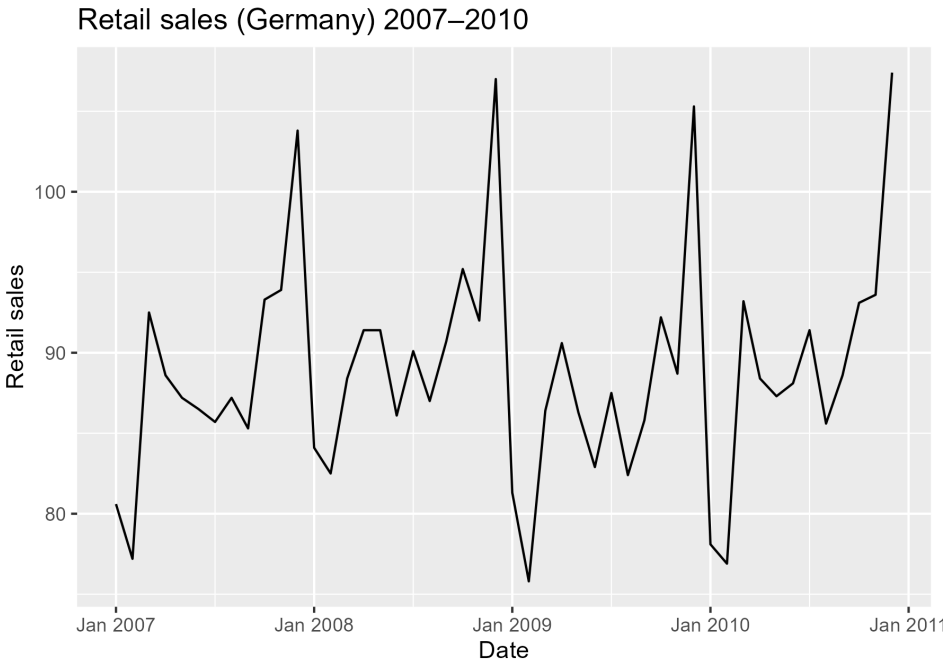
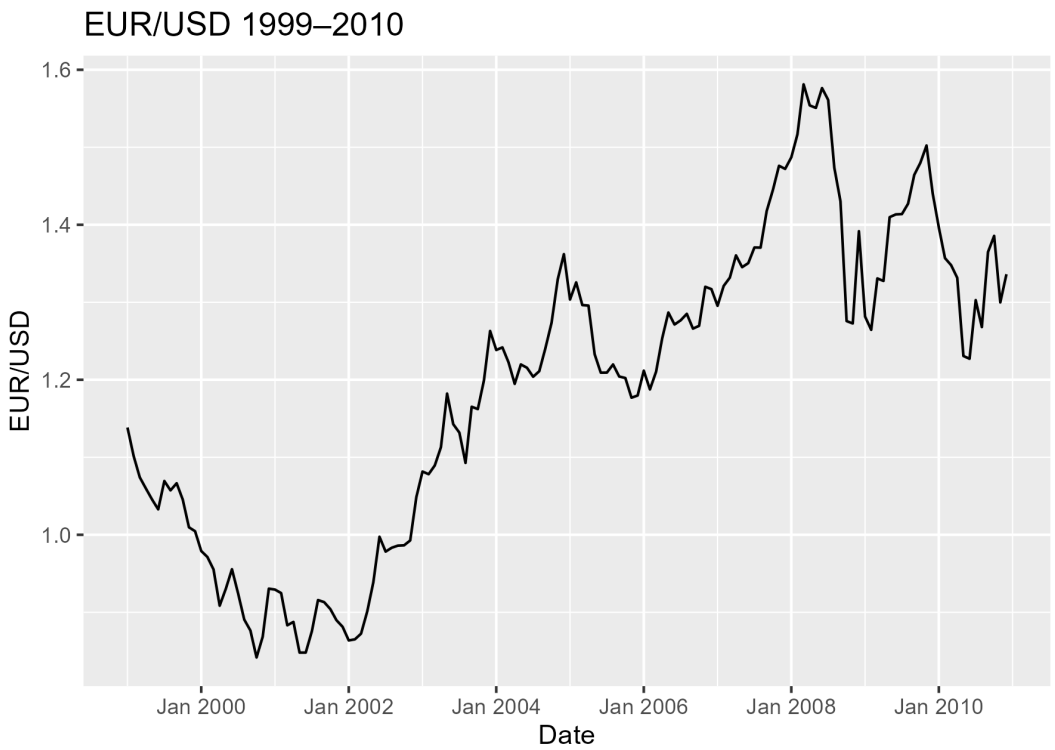




EUR/USD 1999-2010



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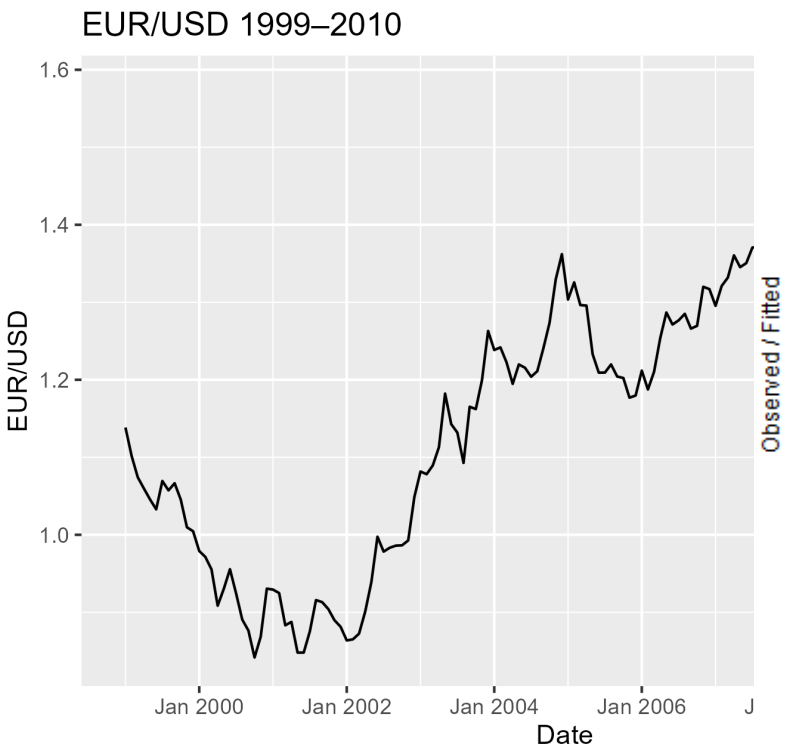

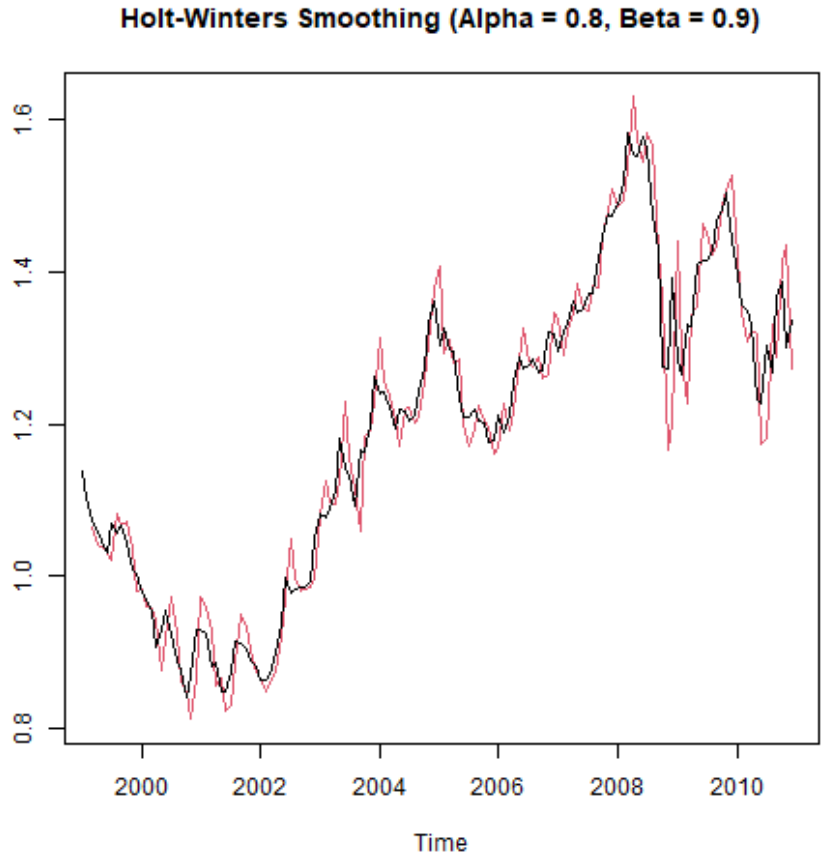

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