Aalto University
School of Business

Time Series Analysis 30E00800 (TSA) Course syllabus and introduction Spring 2020

Tomi Seppälä (TS)

https://www.youtube.com/watch?v=JkN5fDswvSc

Overview

- **The course is suitable especially for information and service management, logistics, finance and economics students but also useful for other students who want to understand and use time series methods in other areas of management and business, such as accounting, marketing and international business. The course also belongs to the minor area in Quantitative Methods as well as to the minor in Analytics and Data Science .**

Prerequisites

The prerequisites for the course are the basic statistics and mathematics courses in the Aalto Bachelor's program in Business, and at least one of the following: *(Introduction to) Econometrics* or *a Second course in Statistics*. Especially it is important that the student understands the main ideas of 1) statistical testing and 2) linear regression analysis prior to attending the course. Due to the quantitative approach in this course, other prior courses in the quantitative areas are useful, too.

Prerequisites

If the student does not possess the minimum skills required as prerequisites (one course in mathematics and two courses in statistics), it does not make much sense to participate in the course. Even with these minimum requirements the course will not be simple.

Learning objectives and outcomes

1. To acquaint you with modeling, understanding and analyzing longitudinal time series data (i.e. longitudinal data) appearing in economics and business.
2. To develop your expertise in analyzing time series data and model them with computer software R, as well as interpret and report your findings. For some some things also Excel may be used for demonstration and visualization.

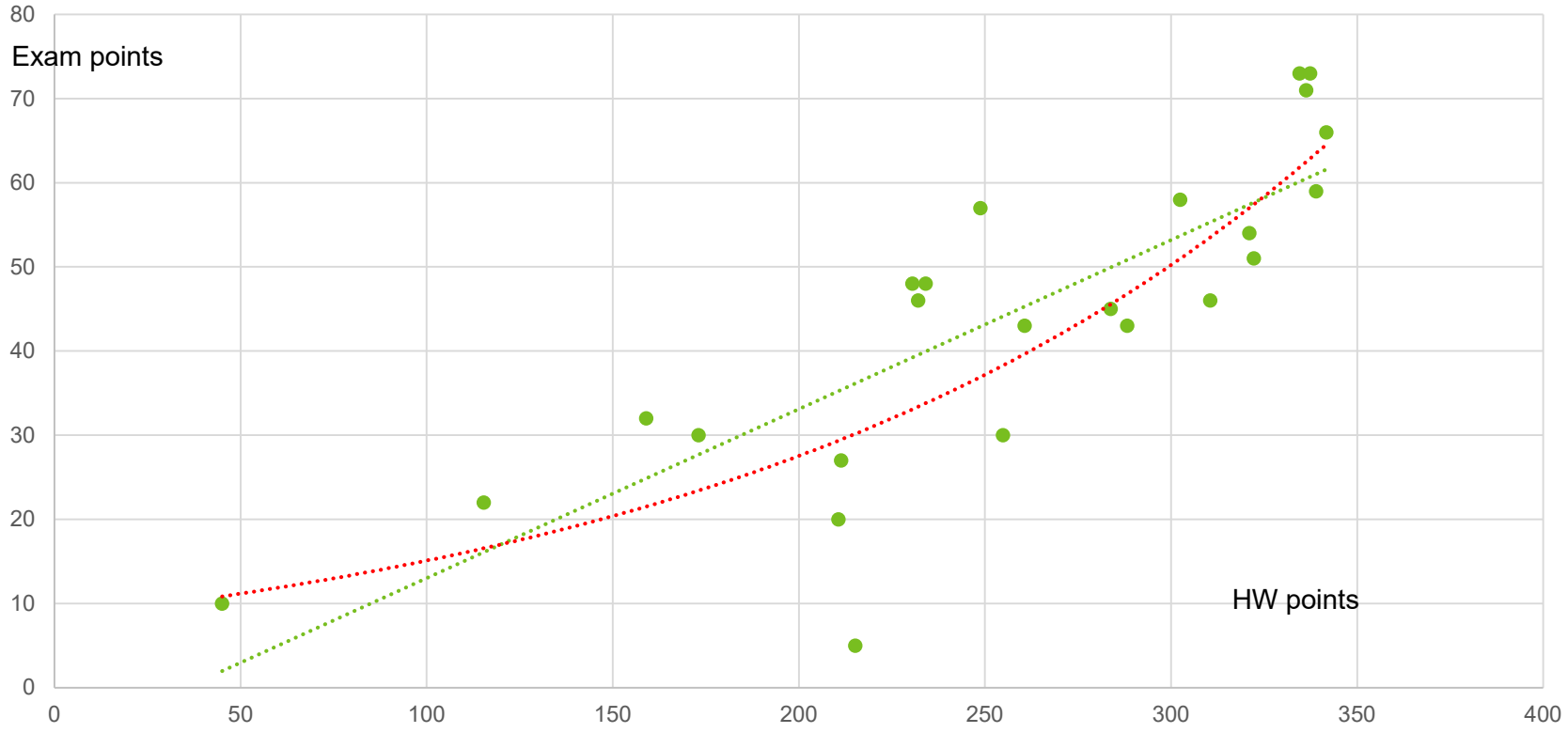
Course essentials of TSA

- Registration via WebOodi
- Teaching period
  - Lectures: during periods 4 and 5 (9 weeks altogether)
  - Exercises and homework assignments
- Instructor: Tomi Seppälä (TS)
- Course assistant: Toan Tran (TT)
- All course information, materials and the latest course news will be stored on the course home page in MyCourses

Completing the course

- **Exam (75 %), must be passed**
- **8 Home work Assignments (+possibly one extra) (25 %)**
  - *Hand calculations + computer based analysis with R (and sometimes Excel)*
  - *Other program (e.g. SPSS, SAS, Stata, Python) may be used for the home work but are not supported in lectures or exercise sessions*
- **Each Homework is worth 40 points, if not otherwise stated**
- **Homeworks are individual! No copying is accepted!**
- **Attendance list and background information of class participants is collected for statistical purposes.**
- **The aim is to study which variables affect learning, and how teaching could be possibly developed in the future.**

Learning by doing (typical relationship of exam and homework points)



Approximate Workload (for an average student to obtain grade 3/5):

- Lectures 36 h
- Exercise sessions 18 h
- Homework preparation 45 h
- Independent work and exam 53 h

Teaching and homework assigments

Lectures (4th period and 3 weeks of 5th period, starts Feb. 25, ends Apr. 29) Teacher: Tomi Seppälä
Tuesdays 10:15-11:45 Class room varies
Thursdays 10:15-11:45 Class room varies

Guided Exercises Teacher: Toan Tran(homework solutions and practical guidance)

Fridays 10:15-11:45 pm U344

Weekly homework assignments are due on Fridays at 10:00.

Two similar R demo sessions will be given on

Thursday 10:15-11:45 U344 and

Friday 10:15-11:45, U344

Tentative Schedule of Lecture Topics

#	Date	Topic	
L1		Introduction to the course and R language	
L2		Used for practicing R language (choose one 2 hour session)	
L3		Multiple linear regression model	
L4		Testing the assumptions of the linear regression model: diagnostic testing	
L5		Introduction to time series models	
L6		AR models	
L7		MA models; ARMA models	
L8		Stationarity of ARMA models	
L9		Modelling principles and forecasting with ARMA	
L10		Random Walk models, unit roots.	
L11		Stationarity tests for time series; order of integration	
L12-L13		Cointegration of Time Series	
L14		ARCH and GARCH models -and their cousins	
L15-L16		Multivariate models;vector autoregression	
L17-L18		Panel data; Course review	
		FOLLOW FOR POSSIBLE CHANGES ON THE WEB PAGE	

Grading (tentative)

Percentage	Grade
86%	5
77%	4
68%	3
59%	2
50%	1
Below 50 %	Fail

Assessment and grading

1. Lectures: theory and examples

   Attendance of participants is collected

1. Exercises and homework (25% of the grade) hands-on exercises + 8 home work sets, attendance is collected
2. Final exam (75 % of the grade, must be passed)

Course material

- **All course communication, materials and exercises as well as the submission of exercises on the course home pages in MyCourses**

Chris Brooks: Introductory econometrics for finance. Second edition or later. Chapters 1-10 (skip some parts, details given during the course). 3rd edition is fine, too.

- **Brooks' Slides for ed. 2 are available in http://www.cambridge.org/features/economics/brooks/PPT.html**

Although the name of the book includes the word "finance", the material is more general and applicable to other areas as well; Financial examples of the book will not be covered in the lectures

Another useful book (used for some parts):

Enders, W.: Applied Econometric Time Series, Second or Third Edition

Some other useful books:

Verbeek, M.: A Guide to Modern Econometrics. Second Edition

Woolridge, J.: Introductory Econometrics - A Modern Approach.

Kozan, R. : Financial Econometrics with EViews (download at http://www.bookboon.com)

Tsay, R. S: Financial Engineering