Econometrics 1

Undergraduate course Q1S2 2023–2024

This outline covers topics discussed in the first half of the semester. The outline is tentative. Instructor reserves the right to make changes. All changes will be announced in class.

General information

Instructor: Dr.rer.pol Alfa Farah
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Class (Meeting & place): see timetable for details

MSTeams: rktde1v

Lecture period: 12 February–29 March 2023

Prerequisites

Economic Statistics

Description

Students participating in this course have completed microeconomics and macroeconomics courses. Thus, they are expected to have a working knowledge about how economists think about the economy. Nevertheless, at this point, they should also ask whether or not this is how the world actually works. So, econometrics is the combination of economic theory, mathematics and statistics to test economic hypotheses from economic theory.

This course provides an introduction to the main methods of econometric analysis. It presents some of the basic methods used in empirical research and enables students to gain understanding of basic econometrics to a standard that will equip them to understand and evaluate most applied analysis of observational data and subsequently be able to apply undertake such

analysis themselves.

In the first quarter, the course focuses on the regression analysis for cross-sectional data. In the second quarter, the course focuses on the basic time series analysis.

Prerequisites

Economic Statistics

Objectives

On successful completion of the course, you should be able to:

1. Explain core concepts and techniques in econometrics, in particular the cross-sectional regression analysis (C2)
2. Explain the assumptions upon which different econometric methods are based and their implications (C2)
3. Explain and exemplify different functional forms of econometric model (C2)

Reading

Required: [W] Wooldridge, J. M. 2016. *Introductory Econometrics: A Modern Approach, 6ed* (Ch. 1, 2, 3, 4, 5, 6)

Additional: [G] Gruber, *Public Finance and Public Policy, 5ed* (Ch. 3).

Selected chapters from Wooldridge:

1. The Nature of Econometrics and Economic Data (Ch. 1)
   1.1. What is Econometrics?
   1.2. Steps in Empirical Econometrics Analysis
   1.3. The Structure of Economic Data
   1.4. Causality and the Notion of Cateris Paribus in Econometric Analysis
2. The Simple Regression Model (Ch. 2)
   2.1. Definition of the Simple Regression
   2.2. Deriving the Ordinary Least Squares Estimates
   2.3. Properties of OLS on Any Sample of Data
   2.5. Expected Values and Variances of the OLS Estimators
3. Multiple Regression Analysis: Estimation (Ch. 3)
   3.1. Motivation for Multiple Regression
   3.2. Mechanics and Interpretation of Ordinary Least Squares (a-h)
   3.3. The Expected Value of the OLS Estimators
   3.4. The Variance of the OLS Estimators

   3.5. Some Comments on the Language of Multiple Regression Analysis
4. Multiple Regression Analysis: Inference (Ch. 4)
   4.1. Sampling distributions of the oLS Estimators
   4.2. Testing Hypotheses about a Single Population Parameter: The t Test
   4.3. Confidence Intervals
   4.5. Testing Multiple Linear Restrictions: The F Test
   4.6. Reporting Regression Results
5. Multiple Regression Analysis: OLS Asymptotics (Ch. 5)
   5.1. Consistency
   5.2. Asymptotic normality and Large Sample Inference
   5.3. Asymptotic Efficiency of OLS
6. Multiple Regression Analysis: Further Issues (Ch. 2, 3 and 6)
   6.1. Effects of data Scaling on OLS Statistics (6.1, 6.1a, 2.4a)
   6.2. More on Functional Form (2.4b, 6.2a, 6.2b, 6.2c)
   6.3. Omitted variable bias (3.3)
   6.4. Goodness-of-Fit: R-Squared vs Adjusted R-Squared (6.3a)
   6.5. Regression through the origin (2.6, 3.2i)

Selected examples from Wooldridge:

- Ch.1: Example 1.1
- Ch.2: Example 2.2, 2.4
- Ch.3: Example 3.1, 3.4
- Ch.4: Example 4.2 (`Link Video`)
- Ch.6: Example 6.1, 6.2, 6.3, 6.4

Lecture Plan

Course will combine lectures and tutorials. Refer to timetable for details of lecture plan. Course materials are available at instructor's homepage.

Problem Sets and Tutorials

There will be 6 problem sets

- PS1 : [G] Ch.3, No. 1, 2, 3, 4, 6, 10, 12, 15
- PS2 : [W] Ch.1, No. 1, 2
- PS3 : [W] Ch.2, No. 1, 3, 4, 5
- PS4 : [W] Ch.3, No. 1, 2, 5, 7
- PS5 : [W] Ch.4, No. 1, 2, 3, 4
- PS6 : [W] Ch.6, No. 1, 3, 7 & Ch. 3 No. 8, 12

Solutions to the problem sets will be discussed during tutorials.

Software

Although the course focuses on the econometric concept, it additionally introduces R statistical software. In tutorial 5 and 6, students will learn to do a basic regression analysis by replicating Example 4.2 using R. Thus, students are suggested to install R and, subsequently, RStudio, on their computer. R can be downloaded from `https://cran.r-project.org` and RStudio from `https://rstudio.com/products/rstudio/download/`.

Students are suggested to check these materials to get familiar with R and RStudio :

- Introduction to R in Bahasa Indonesia (`https://www.youtube.com/watch?v=1ZQz88XipSU`)
- Introduction to RStudio in English (`https://www.youtube.com/watch?v=eBJ9Yo6flsM`)
- "Introduction to RStudio" by Oscar Torres-Reyna (`https://dss.princeton.edu/training/RStudio101.pdf`)

Being familiar with R and RStudio is also a good preparation for Econometrics 2 because in Econometrics 2, you are required to use R in your empirical analysis.

Course Assessment

The final grade will be based on your performance in all forms of assessment according to the following distribution:

- Quiz 25%
- Written Exam 25%

Grading Policy

Grades must reflect mastery, not just effort! In order to earn a good grade, students need to do well during their assignments and exams. Students who do well during assignments and exams typically read the course outline carefully, go to classes regularly, read the suggested readings, do the their homework and ask for help.

80.00 - 100.00	A
70.00 - 79.99	B
60.00 - 69.99	C
51.00 - 59.99	D
0.00 - 50.99	E

University Attendance Policy

Students are expected to attend classes regularly. A student is required to attend a minimum of 75% of the classes in order to sit the final exam.

Study Tips

The readings and problem sets can be overwhelming. Here are some tips:

1. Read the course outline and the timetable carefully.
2. Print the slides and the selected examples (of Wooldridge) before the respective meeting. Printing enables you to makes notes in the slides/examples!
3. Read the slides before the respective meeting!
4. Have your printed slides, your printed examples and pencils ready during the lectures!
5. Share your burden! Create a study group. Distribute topics/chapters to each member of the group. Each member is responsible to read (or summarize) their assigned topics/chapters. Meet regularly to discuss the topics.
6. Do and discuss the problem sets with your group, even when it is not graded.
7. Attend tutorials regularly!
8. Ask questions!
9. Relax! You have the right to study in your own pace!
10. It is okay to get frustrated! Everybody gets frustrated when they study Econometrics! The good thing about frustration is that it implies that you put you best efforts! When you do get frustrated, do not push yourself! Instead, stay away for a while but do not forget to go back!

Last updated: February 12, 2024

Timetable for Econometrics 1
Q1S2 2023–2024
Instructor: A. Farah

Lectures & Tutorials

Week	L/T	IUP	D	Topic	Slides	Reading	Homework
1	Lec 1*	Tue, 13.02, 10.00–12.30	Fri, 16.02 13.00–15.30	1. Introduction	Slides 1	[G] Ch. 3 [W] Ch. 1 (1-1 , 1-2, 1-3, 1-4)	PS1, PS2
2	Lec 2	Mon, 19.02, 07.00-09.30, EC.201	Mon, 19.02, 07.00-09.30, EC.201	2. Simple Regression Model	Slides 2	[W] Ch. 2 (2-1, 2-2, 2-3, 2-4c, 2-5)	PS3, PS4
3	Tut 1	Fri, 01.03 13.00–15.30, EC.302	Fri, 01.03 13.00–15.30, EC.302	PS1 & PS2			
4	Lec 3 Tut 2*	Tue, 05.03, 10.00–12.30, EL.202A Sat, 09.03, 08.00–10.00	Fri, 08.03, 13.00–15.30, EC.302 Sat, 09.03, 08.00–10.00	3. Multiple Regression Analysis: 3.1. Estimation PS3 & PS4	Slides 3	[W] Ch. 3 (3-1, 3-2 (a-h), 3-3, 3-4, 3-5, 3-6)	 PS4, PS5
5	Lec 4 Tut 3*	Fri, 15.03, 09.30–12.00, EC.203 Sat, 16.03, 08.00–10.00	Fri,15.03 13.00–15.30, EC.302 Sat, 16.03, 08.00–10.00	3. Multiple Regression Analysis: 3.2 Inference & OLS Asymptotic PS5 & PS6	Slides 4 Slides 5	[W] Ch. 4 (4-1, 4-2, 4-3, 4-5, 4-6) [W] Ch. 5	
6	Lec 5 Tut 4*	Tue, 19.03 10.00–12.30, EL.202A Sat, 23.03, 08.00–10.00	Fri, 22.03 13.00–15.30, EC.302 Sat, 23.03, 08.00–10.00	4. Further Issues 4.1 Omitted variable bias 4.2 Data Scaling 4.3 Beta Coefficient 4.4 Logarithmic Terms PS6	Slides 6	 [W] Ch.3 (–3.3) [W] Ch.2 & 6 (6.1, 6.1a, 2.4a) [W] Ch.6 (6.1a) [W] Ch.2 & 6 (2.4b, 6.2a)	PS6
7	Lec 6 Tut 5*	Tue, 26.03 10.00–12.30, EL.202A Sat, 30.03, 08.00–10.00	Thurs, 28.03 15.30–18.00, EC.201 Sat, 30.03, 08.00–10.00	4. Further Issues (cont.) 4.5 Quadratic Terms 4.6 Interaction Terms 4.7 R-Squared vs Adj. R-Squared 4.8 Regression through the origin Replicating example 4.2 using R	Slides 6	 [W] Ch.6 (6.2b) [W] Ch.6 (6.2c) [W]Ch.6 (6.3a) [W] Ch.2 & 3 (2.6, 3.2i)	

*Online in MSTeams. Time in on WIB.