BS2280 - Econometrics 1

Lecture 1 - Part 1: Introduction to the Module and R

Dr. Yichen Zhu

Structure of today's lecture

Contact Details

- Module leader: Dr Yichen Zhu
  - Location: Room SW911B, South Wing, Main Building
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  - Ext.: 4441
- All office hours appointment by default on campus. Please book appointments through WASS:
- `https://wass.aston.ac.uk/pages/viewcalendar.page.php?makeapp=1&cal_id=427`
- If you want to meet online, please state in your WASS booking. I will use MS Teams for all my appointments. I will send out an invite to you via email so that you can join a chat with myself at the arranged time.

Module Format

Lecture

- Every week
- Hybrid
- **Lecture part 1**:
  1 hour pre-recorded videos equivalent to 1 hour lecture (must watch lecture part 1 before attending lecture part 2)
- **Lecture part 2**:
  1 hour in-class lecture

Seminar/ R Workshop

- Every week
- 1 hour in-class Seminar
  OR
  1 hour in-class R Workshop

PAL session (optional)

- Every two weeks
- 1 hour online R peer-assisted learning sessions (PAL sessions)

Module Structure

Lectures - Indicative Content

- Week 1. Introduction and Review of Fundamental Statistical Concepts
- Week 2. Simple Regression Analysis
- Week 3. Properties of OLS
- Week 4. Hypothesis Testing
- Week 5. Multiple Regression Analysis I
- Week 6. Multiple Regression Analysis II
- Week 8. Dummy Variables
- Week 9. Nonlinear Models and Transformation of Variables I
- Week 10. Nonlinear Models and Transformation of Variables II
- Week 11. Multicollinearity
- Week 12. How to write an econometrics report

Module Structure

Seminar/R Workshop - Indicative Content

- Week 1. Seminar: Meet the employability team
- Week 2. R Workshop 1
- Week 3. Seminar 1: Homework sheets 1 and 2
- Week 4. R Workshop 2
- Week 5. Seminar 2: Homework sheets 3 and 4
- Week 6. R Workshop 3
- Week 8. Seminar 3: Homework sheets 5 and 6
- Week 9. R Workshop 4
- Week 10. Seminar 4: Homework sheets 7 and 8
- Week 11. R Workshop 5
- Week 12. Seminar 5: Coursework Drop-in sessions

Module Objectives and Learning Outcomes

- Demonstrate an understanding of important introductory statistical and econometric concepts.
- Critically evaluate basic econometric and statistical models and the assumptions that underpin them.
- Apply econometric techniques using real world data.
- Communicate in clear and concise language the econometric concepts discussed in the course.

Assessment

Assessment Type	Weight	Deadline
500 words statistical report	20%	TBC
1,500 words individual statistical report	70%	TBC
Placement Preparation Assessment	10%	TBC

Assessment

Individual Report

- The individual statistical report will require you to
  - prepare and read in a non-native real world data set into R
  - generate numeric and graphical summary statistics
  - run regressions with R and interpret and evaluate results
  - highlighting the limitations of your analysis
  - using a clear and concise language, write up your results in a report
- Guidance for this element will be provided throughout the semester.

Placement Preparation Assessment

- The placement portfolio prepares you for finding a suitable placement for the placement year.
- You will specifically focus on recognising and presenting the quantitative and analytical skills that you acquire in this module.

Reading List

Core textbook

- Introduction to Econometrics, 5th ed, by C. Dougherty
- Read Review Chapter + Chapters 1-5
- Older editions also fine

Other recommended textbooks

- Introduction to Econometrics, 3rd ed, by J. H. Stock and M. W. Watson
- Essentials of Econometrics, 3rd ed, by D. N. Gujarati
- Basic Econometrics, 5th ed, by D. N. Gujarati and D. C. Porter
- Econometrics by Example, D. N. Gujarati

Making the most out of this module

- Econometrics often seen as a difficult subject, but once the basics are mastered, it is rewarding and increases employability!
- Engage with the module
- You will have to use the econometric software package R for your report. You will not be able to learn the R language a week before the submission deadline, start using the programme from the beginning
- Complement lectures with textbook readings
- Attempt to solve homework questions

Let's get started!!!

"Experience has shown that each of these three view-points, that of statistics, economic theory, and mathematics, is a necessary, but not by itself a sufficient, condition for a real understanding of the quantitative relations in modern economic life. It is the unification of all three that is powerful. And it is this unification that constitutes econometrics."

Ragnar Frisch, Econometrica, (1933), 1, pp. 1-2.

Why do we need econometrics?

Econometrics helps us to test our (economic) theories with real world data

E.g. Does a higher minimum wage increase unemployment

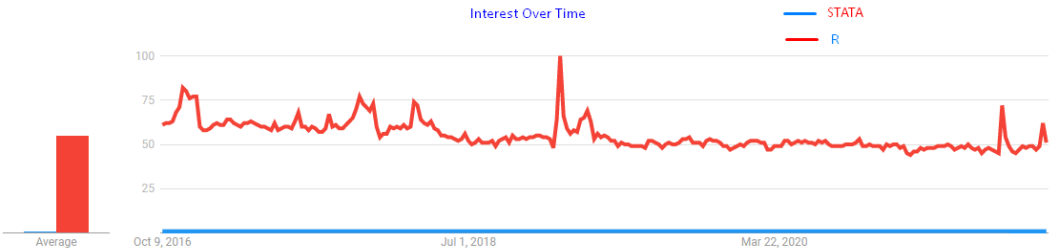
It also helps us to quantify relationships

E.g. On average, how much more will you earn when you complete a university degree?

We can also use it as a crystal ball to generate forecasts

E.g. What will be the impact of increasing temperature on economic growth?

Why R


Interest Over Time
STATA
R
100
75
50
25
Average
Oct 9, 2016
Jul 1, 2018
Mar 22, 2020

Why R

- R is a statistical software package
- More powerful for statistical analysis than Excel
- Open source and free!
- Used widely in academia and private sector
- Getting to know R will make it much easier for you to learn other programming languages, such as Python
- You will need R to complete your econometrics assignments.
- Econometrics 2 and Microeconometrics will also use R

Download and installation

If you want to install R and Rstudio on your computer, you need to complete following two steps:

- Step 1. Download R and install R
- Step 2. R is just a console which is very boring and not user-friendly. To facilitate your work with R, **after you install R**, you need to download Rstudio and install Rstudio, which is the integrated development environment (IDE), Here is the link you need to use to download and install R and Rstudio: `https://posit.co/download/rstudio-desktop/`
- Step-by-Step videos about R download and installation can be found on our module Blackboard – Install R and Rstudio `https://vle.aston.ac.uk/ultra/courses/_49278_1/cl/outline`

Using R as a calculator

- R follows the same mathematical operators conventions as most other programmes:

```
5 + 2        #  Summation
5 * 2        #  Product
5/2          #  Division
5^2          #  Power
sqrt (5)     #  Square root
```

Assigning objects

- You can store any of your results as an R object and use it for further calculations. For example:

```
x <- 5 * 2    #   assign the results of 5 * 2 to x
x
[1] 10

y <- x^2      #   use x for further calculations
y
[1] 100
```

- Assigning values to an object will be very important when we undertake regression analysis.

Requirement for econometrics

- We will require several concepts from your introductory statistics module
- Key concepts will be reviewed in lecture 1 part 2
- If you need a more in-depth refresher, please consult:
  - Your statistics lecture slides from last year
  - Review chapter in core textbook
  - Recommended Statistics books:
  - Barrow, M. (2017). Statistics for Economics, Accounting and Business Studies. 7th Ed, Pearson.
  - Rowntree, D. (2000) Statistics without tears: An Introduction to Statistics for Non-Mathematicians. New Ed, Penguin.