

Research Methods Part II: Quantitative Methods

Objectives of the course

The aim of this course is to familiarise students with the basic statistical methods used in quantitative social research, with a focus on development. The emphasis will be on the intuitive understanding of concepts and procedures (the mathematical derivation of the techniques will be skipped), but the logic and reason behind each formula will be discussed. The course aims to develop skills in research methods for those who have no prior experience, and to enhance the skills of those with some prior knowledge.

Introductory sessions in MT

Optional lectures: Introduction to basic statistical concepts and measures
Two introductory sessions to Stata

Time & Venue: Seminar Room 1 (TBA)

(Laptops are required; at least one laptop for two students. Students will have access to Stata licenses)

Lectures in HT

Weeks 1-4 – Professor Krishnan

Weeks 5-8 – Professor Woodruff

Time: & Venue: Seminar Room 3, Tuesdays 11-1.

Classes in HT

Thomas Quirk and Kurtis Lockhart – MPhil

Jamelia Harris and Judith Guo - GGD

Weeks 1-8: Group 1 & Group 2: 2 hours per week (see Weblearn)

Office Hours

TAs

Weeks 2-8: 1 hour per week

Chris or Pramila

Weeks 2-8: appointment required

Organisation of teaching

In Michaelmas Term, **3 optional sessions (one theory, two Stata)** are organized in order to bring the students without prior knowledge in statistics up to a level that allows them to follow HT lectures/classes without major difficulties.

In Hilary Term, the course consists of **8 lectures and 8 classes**. The lectures are dedicated to the introduction of theoretical concepts in a didactical way using as many examples as possible and discussing research papers. The classes are mainly dedicated to going through the solutions to problem sets handed out a few days in advance. The main theoretical concepts will also be discussed with the help of practical examples from research papers. Students with previous training in statistics may wish to attend more advanced statistical courses for the social sciences.

The **coursework** includes (1) the submission of the solutions to problem set questions on a weekly basis (7 problem sets); and (2) a series of readings. The problem set questions will be uploaded on Weblearn from week 1 to week 7. The coursework will be graded although the marks are only indicative and are meant to help assessing progress and preparing for the examination and thesis. For the weekly problem sets, group work is fine, with the understanding that the objective is to enhance own understanding of the material.

In Trinity Term, 1 or 2 review sessions will be organized in preparation to the final exam.

Assessment

The course is evaluated by a **written exam** in Trinity Term (for both Qualitative and Quantitative Methods). Students must answer three questions in total, and at least one from each section. A list of formulas is provided, so that students do not have to memorise those long formulas, but the list has more formulas than are required in the examination, so that students are required to identify the ones they need.

Course Outline

Suggested textbooks and readings

There are any number of excellent textbooks and introductions to quantitative methods for the social sciences and you might prefer a particular pedagogical style over another. We list some recommendations below that are available for free, online. The first is a textbook for statistical concepts, while the second is an online guide to statistical software, STATA that we will use. In addition, we have also listed textbooks that might be useful.

1. For learning basic **statistical concepts**, *OpenIntro Statistics, 3rd Edition* by David M. Dietz, Christopher D. Barr, and Mine Cetinkaya-Rundel published in 2015 is available online for **free** as a pdf or for less than £10 from Amazon. (This book covers the first 4 weeks of the course).
https://www.openintro.org/stat/textbook.php?stat_book=os
2. For learning **statistical software**, an useful resource is:
<http://www.lse.ac.uk/Methodology/Software-tutorials/Stata-tutorials>

Main textbooks

U: Urdan, T.C.,2005, *Statistics in Plain English*, Lawrence Erlbaum Associates Publishers, 2nd edition.

AF: Agresti, A. and B. Finlay,1997. *Statistical Methods for the Social Sciences*, 3rd edition, Prentice Hall

IEP: Gertler, P.J., Martinez, S., Premand, P., Rawlings, L.B. and C.M.J. Vermeersch, 2011, *Impact Evaluation in Practice*, Second Edition, World Bank (<https://openknowledge.worldbank.org/handle/10986/25030>)

Friendly introductions and interesting resources:

Dilnot, A., 2010. *The tiger that isn't: seeing through a world of numbers*. Profile Books. <http://plus.maths.org/content/tiger-isnt>

C. Wheelan, 2013. *Naked Statistics: Stripping the Dread from the Data* .

Klein, G & A Dabney, 2013. *The Cartoon Introduction to statistics*, Hill and Wang.

Podcasts: T. Harford, More or Less. <http://www.bbc.co.uk/programmes/b006qshd>

A full list of resources is attached at the end of this outline.

Lectures and Classes

Part I: Introduction to Quantitative Social Science Methods

Week 1. Basic statistical concepts – Introduction to identification issues

Content: Descriptive vs. inferential statistics. Basic statistical measures. Major questions and structure of the course. Introduction to identification issues.

Reading:

U 1-6; AF 3-4, OpenIntro Chap 1, sections 6 and 7.

Class: Working with data - Descriptive statistics – Visualizing data

Schwabish J., 2014. An Economist's Guide to Visualizing Data. *Journal of Economic Perspectives* 28 (1): 209-34.

Other useful readings:

Tufte, E. R., 2008. *The Visual Display of Quantitative Information*. Cheshire, Connecticut: Graphics Press p1-15, 123-137.

Kastellec, J. P. and E. L. Leoni., 2007. "Using Graphs Instead of Tables in Political Science". *Perspectives on Politics* 5.4, pp. 755–771

Week 2. Sampling Designs

Content: Probability sampling vs non-probability sampling

Reading:

OpenIntro Statistics, Chapter 1, Sections 1-5; AF Chapter 1

S.L. Lohr, 1999. *Sampling: Design and Analysis*, Pacific Grove and Duxbury Press 2nd ed. Chapter 1, Chap 2, 2.1-2.3, Chapter 14.

Class: Respondent and snowball sampling: Pros and Cons

Magnani R., Sabin K., Saidel T., Heckathorn D. D., 2005. Review of Sampling Hard-to-Reach and Hidden Populations for HIV Surveillance. *AIDS* 2005.19 Suppl2:S67–S72.

At: http://conium.org/~maccoun/PP279_Magnani.pdf

Week 3. Basic statistical tests

Content: point estimation; standard error; t-statistic; hypothesis testing: z- test/t-test; critical value; statistical significance, significance level; p-value.

Reading:

U 7 & 9; AF 5 (5.1 & 5.3) – 6 (6.1, 6.2, 6.4 & 6.5) – 7 (7.1 & 7.3)

Openintro Statistics: Chapters 3-6

Class: Hypothesis testing : z-test/t-test.

Anderson, C.L., Reynolds, T.W., and M.K. Gugerty, 2017. Husband and Wife Perspectives on Farm Household Decision-making Authority and Evidence on Intra-household Accord in Rural Tanzania. *World Development*, 90, pp. 169-83.

(Focus on: Introduction, Section 2, Section 3 (stop before point (i)), Section 4 on results: only part (ii) (Figure 2 and Table5!)).

Week 4. Basic statistical tests (con't), Correlation and Simple Regression

Content: Hypothesis testing: Chi-squared test. Correlation and Introduction to linear regression.

Reading:

AF 8 (8.1 & 8.2); U 14; Openintro stats: Chaps 3-6

AF 9, 10 (10.1 & 10.2) & 11 (11.1 to 11.5); U: 8 &13 [Note: “Correlation” and “Regression Analysis”, which is chapters 12 and 13 in the 4th edition.]

Additional reading:

Kahneman, D., 2011. *Thinking, Fast and Slow*. Penguin, Chapter 17.

Class: Hypothesis testing II: chi-squared test.

Licklider, R., 1995. The Consequences of Negotiated Settlements in Civil Wars, 1945-1993. *American Political Science Review*, Vol. 89(3), pp.681-690.

Hajj, M., and U. Panizza, 2009. Religion and education gender gap: are Muslims different? *Economics of Education Review* 28: 333-344.

Part II: Regression Analysis and Causal Inference

Week 5. The basics of regression analysis

Content: Linear regression: estimation, inference and interpretation. Multiple regression analysis: dummy variables; interaction terms.

Reading: [From the previous week]

Class: Regression analysis I: Multiple regression analysis: linearity, non-linearity.

Barro, R.J., 1996. "Democracy and Growth". *Journal of Economic Growth*, Vol. 1, pp.1-27.

Collier, P. and D. Dollar, 2001. "Aid allocation and poverty reduction", *European Economic Review*, 46, pp. 1475-1500.

Week 6: Bias, endogeneity & causal inference

Content: sources of bias: sample bias, omitted variable bias, reverse causality bias, mismeasurement problem, spurious relationship - Solutions: control variables, instrumental variables, fixed effects.

Reading: IEP Chapters 3 and 5

Practical example: Nathan Nunn and Nancy Qian (2014), "US Food Aid and Civil Conflict", *American Economic Review*, Vol. 104(6), pp. 1630-1666.

Class: Instrumental Variables (IV)

Acemoglu, D., Johnson, S. and J. Robinson, 2001. "The Colonial Origin of Comparative Development: An Empirical Investigation", *American Economic Review*, 91(5), pp. 1369- 1401.

Week 7. Impact analysis: experimental and quasi-experimental data

Content: Evaluation problem; counterfactual; selection bias; randomized control trial; natural experiment.

Readings: IEP Chapter 4

Jonathan Bauchet and Jonathan Morduch, 2010, "An Introduction to Impact Evaluations with Randomized Designs," Financial Access Initiative Research Framing Note.

Class: Impact analysis I: RCTs & Discontinuity Designs

Banerjee, A., Duflo, E., Glennerster, R. and C. Kinnan, 2015. "The Miracle of Microfinance? Evidence from a Randomized Evaluation." *American Economic Journal: Applied Economics*, 7 (1): 22-53.

Week 8. Impact Analysis: Non-experimental data

Content: Regression discontinuity; difference-in-difference; propensity score matching

Reading: IEP Chapters 6 (*RD*), 7 (*Diff-in-Diff*) and 8 (*matching*)

A cautionary example:

Myerson, E., 2014. "Islamic Rule and the Empowerment of the Poor and Pious", *Econometrica*, Vol. 82(1), pp. 229-269)

Class: Impact analysis: Diff-in-Diff & Matching techniques

Lenz, L., Munyehirwe, A., Peters, J. RG, and M. Sievert, 2017. Does Large-Scale Infrastructure Investment Alleviate Poverty? Impacts of Rwanda's Electricity Access Roll- Out Program. *World Development*, 89, pp. 88-110.

Reading list

Introductory books:

Angrist, J.D. & J-S. Pischke, 2008. *Mostly Harmless Econometrics*. Princeton University Press.

Angrist, J.D. & J-S. Pischke, 2015. *Mastering Metrics. The Path from Cause to effects*. Princeton University Press.

Dilnot, A., 2010. *The tiger that isn't: seeing through a world of numbers*. Profile Books.
<http://plus.maths.org/content/tiger-isnt>

C. Wheelan, 2013. *Naked Statistics: Stripping the Dread from the Data* .

Klein, G & A Dabney, 2013. *The Cartoon Introduction to Statistics*, Hill and Wang.

Main textbooks:

U: T.C. Urdan, 2005. *Statistics in Plain English*, Lawrence Erlbaum Associates Publishers, 2nd edition.

AF: Agresti, A. and B. Finlay, 1997. *Statistical Methods for the Social Sciences*, 3rd edition, Prentice Hall.

Chapter 3: the whole chapter

Chapter 4: the whole chapter

Chapter 5: 5.1 & 5.3

Chapter 6: 6.1, 6.2, 6.4 & 6.5

Chapter 7: 7.1 & 7.3

Chapter 8: 8.1 & 8.2

Chapter 9: the whole chapter

Chapter 10: 10.1 & 10.2

Chapter 11: 11.1 to 11.5

IEP: Gertler, P.J., Martinez, S., Premand, P., Rawlings, L.B. and C.M.J. Vermeersch, 2011, *Impact Evaluation in Practice*, The World Bank.

Online: http://www.fapesp.br/avaliacao/manuais/impact_evaluation_2016.pdf

Other useful textbooks in statistics:

- Kennedy P. (2003). *A Guide to econometrics*
- Gujarati, Damodar N. (2003), *Basic Econometrics*, 4th edition, London: McGraw-Hill
- Dougherty C. (2001), *Introduction to Econometrics*, 3rd edition, Oxford University Press.

- Wooldridge J. M. (2003), *Introductory Econometrics: A Modern Approach*, 2nd edition, Thomson, South Western.
- Angrist J and Pischke, JS (2015) *Mastering ‘Metrics*, Princeton University Press.

Impact analysis

- Duflo, Esther, Rachel Glennerster, and Michael Kremer. 2004. “[Randomized Evaluations of Interventions in Social Science Delivery](#).” *Development Outreach* March 2004.
- Ravallion, Martin. (1999). "The Mystery of the Vanishing Benefits: Ms. Speedy Analyst's Introduction to Evaluation." Policy Research Working Paper 2153, World Bank, Development Economics Research Group, Washington, D.C.
- August Deaton (2010), "Instruments, Randomization, and Learning about Development", *Journal of Economic Literature*, 48: 424-455.
- Martin Prowse and Laura Camfield (2009), “What role for qualitative methods in randomized experiments?”, IOB Working Paper 2009/05, University of Antwerp.
- Greene, J. C., Caracelli, V. J., and Graham, W. F. (1989), 'Toward a Conceptual Framework for Mixed-method Evaluation Designs', *Educational Evaluation and Policy Analysis*, 11 (3): 255-74.
- Bryman, A. (2006), 'Integrating Quantitative and Qualitative Research: How is it Done?' *Qualitative Research*, 6 (1): 97-113.
- Paul J. Gertler, Sebastian Martinez, Patrick Premand, Laura B. Rawlings, Christel M. J. Vermeersch (2011), *Impact Evaluation in Practice*, The World Bank.

Stata introductory books

- Cameron Colin and Trivedi Pravin (2009), *Microeconometrics using Stata*, Stata Press
- Christopher F. Baum (2006), *An Introduction to Modern Econometrics Using Stata*.
- Acock, Alan, *A gentle introduction to Stata*, 3rd Edition, Stata Press
- Kohler and Kreuter (2009), *Data Analysis Using Stata*, 2nd edition, Stata Press
- Pevalin, David and Karen Robson (2010), *The Stata survival manual*. Maidenhead, UK: Open University Press

Stata: (Some) Online Resources

General resources:

- UCLA Stata portal: <http://www.ats.ucla.edu/stat/stata/>

- Princeton Data Services: [http://dss.princeton.edu/online help/stats packages/stata/](http://dss.princeton.edu/online_help/stats_packages/stata/)
- Stata Forum: <http://www.statalist.org/>

Online course targeted at beginners:

- University of Cape Town:
<http://www.saldru.uct.ac.za/home/index.php?/Online-Course/online-course>
- University of Northern Carolina - Chapel Hill:
http://www.cpc.unc.edu/research/tools/data_analysis/statatutorial
- University of Wisconsin - Madison: <http://www.ssc.wisc.edu/sscc/pubs/sfr-intro.htm>
- LSE: <http://www.lse.ac.uk/methodology/tutorials/Stata/home.aspx>
- Stata project blog: <http://stataproject.blogspot.co.uk/>

PDF:

- Princeton quick Stata guide: http://www.princeton.edu/wwac/academic-review/stata/507c/stata_guide.pdf
- Baum's Presentation at Boston College:
<http://fmwww.bc.edu/GStat/docs/StataIntro.pdf>
- Kennedy School:
<http://www.hks.harvard.edu/fs/pnorris/DPI403%20Fall09/STM103%20Introductory%20Guide%20to%20using%20Stata.pdf>