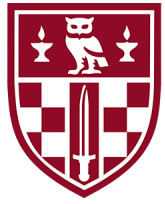
Advanced Topics in Quantitative Social Research

Week 1: Welcome and Introduction

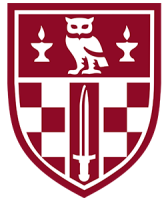
Plan for today

- **Module overview**
  - Objectives and arrangements
  - Syllabus: Readings and tutorials
  - Assessment and presentations (Week 11)
- **Introduction**: Tell us about yourself
- **Exercise**: A quick recap on OLS (and will be continued in Week 2)



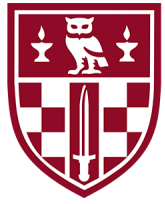
Objectives and arrangements

- Advanced Quants covers a selection of topics on **model-** (Weeks 2-4) and **design**-based (Weeks 7-10) statistical inference
- Students are expected to be familiar with **multiple linear regression** and **basic `R` programming** before they join
- The weekly syllabus is **tentative** and can be adjusted depending on students' progress
- The 90-min in-person tutorials will be used to
  - Answer your questions about the readings and recorded lectures
  - Give you the chance to implement the analysis in `R`
  - Help you prepare for the final project (Weeks 5 and 11)

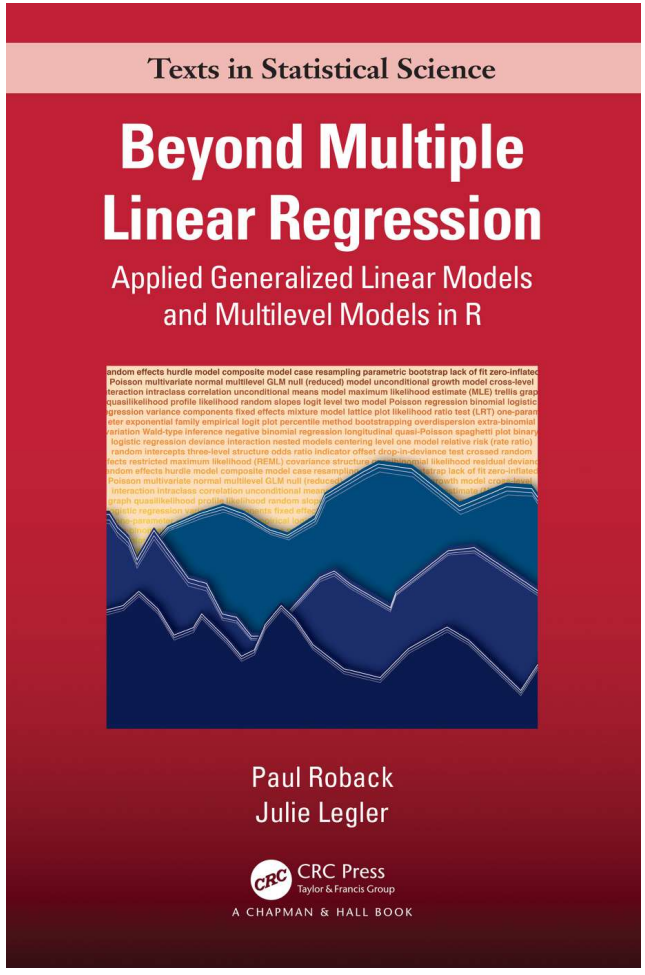


Weekly syllabus

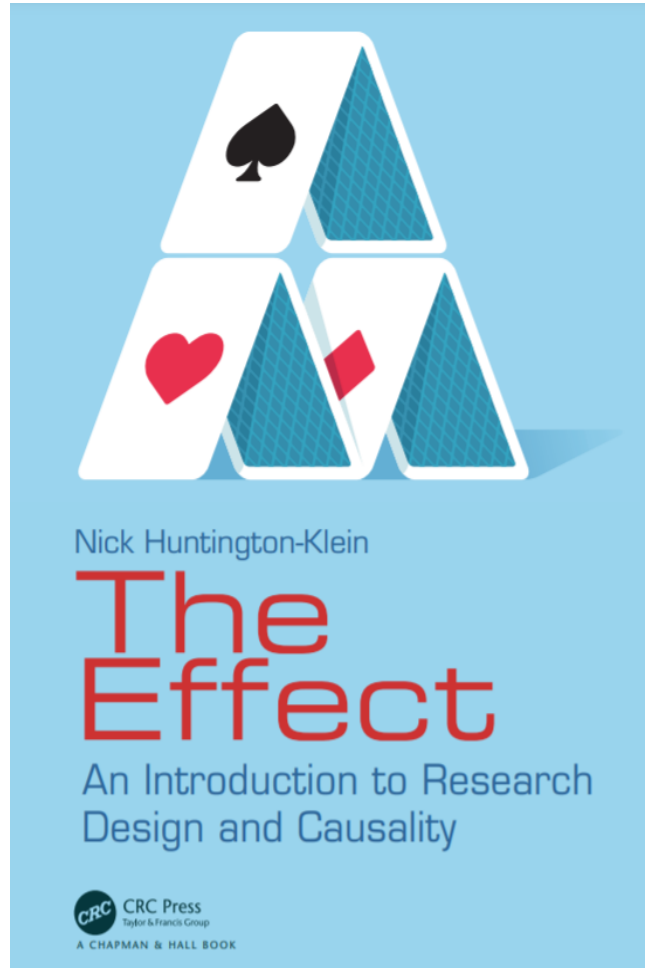
- **Week 1**: Introduction
- **Weeks 2-4**: Generalized linear model
  - Week 2: From OLS to GLM
  - Week 3: Logit regression
  - Week 4: Multilevel modeling
- **Weeks 5**: Final analytical project
- **Weeks 7-10**: Applied causal inference
  - Selection on the observables (matching)
  - Regression discontinuity design
  - Instrumental variable
  - Difference-in-difference
- **Week 11**: Looking beyond adv quants



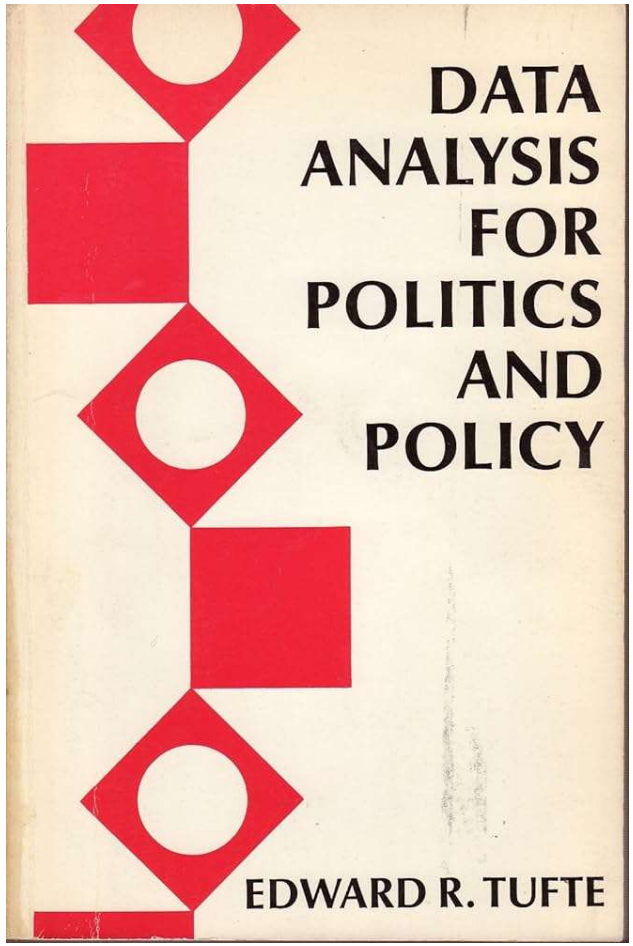
Textbooks: Clear explanation without much math (under most circumstances)



For Weeks 2-4



For Weeks 7-10


DATA
ANALYSIS
FOR
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AND
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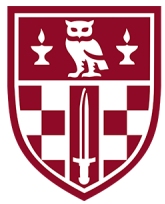
EDWARD R. TUFTE

Additional resources on Moodle

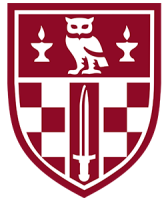
- You can find a variety of additional/supplementary resources – the key principle is to be **selectively thorough**.
  - Supplementary textbooks: Use them when you find the main text is not clear; feel free to discuss with me if you are interested in purchasing any of them
  - Mathematics refresher: Review key math concepts and terms, especially **basic algebra**, if necessary; **Khan Academy** is a good start
  - R Programming: Help yourself when you have a hard time; pick one of the books and use the online community (e.g., **R-bloggers** and **Stack Overflow**) to keep yourself updated
  - Podcasts: Get a sense of how professional quant social researchers present and discuss their work



Assessment

- **Exercises I and II** (20%): Students will complete **two short data analytical exercises** based on the weekly tutorials.

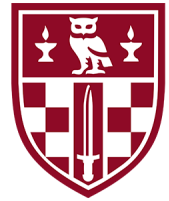
- **Final project** (60%): Students will complete **a quantitative research note of about 4,000 words**, excluding footnotes, bibliography, and appendices (R script and supplementary information). More details will be discussed in **Week 5**.



Next week

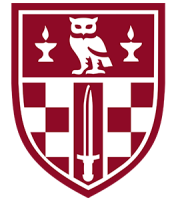
- We will review OLS and discuss why we need GLM (non-linear multiple regression)

- Before you come to class
  - Install *R* and *RStudio* on your laptop and bring it to class
  - Read the assigned chapters (either *Beyond Multiple Linear Regression* OR *The Effect*)
  - Watch the recorded lecture (uploaded on Thursday or Friday)

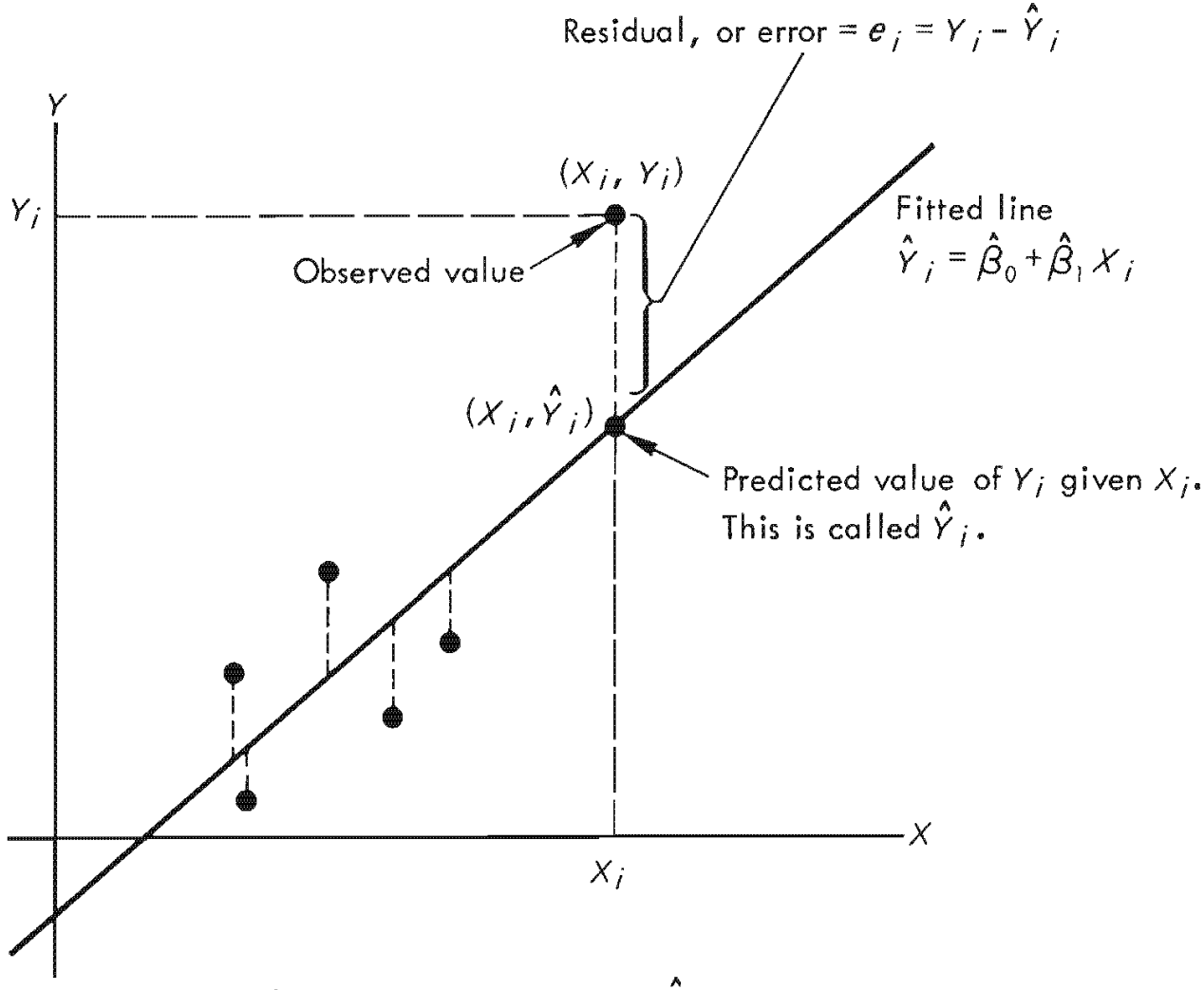


Introduction

- Please share your name, course, and subject area (e.g., political science) with us.
- Please share your experiences with quant social research. What are some of the most rewarding and/or challenging moments?
- Please share your potential research ideas for the final project. Any datasets you plan to study? We will continue the discussion on your research ideas in Week 5.

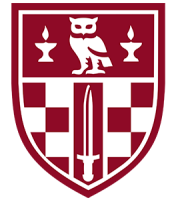


Recap: OLS



Predicted value of Y for a given $X_i = \hat{Y}_i$

$= \hat{\beta}_0 + \hat{\beta}_1 X_i$



Recap: OLS

- Go through the **two-dimensional scatterplot**; locate and define/explain the following concepts:
  - Explanatory and dependent variables
  - Data point or individual observation
  - Fitted line (intercept and slope)
  - Residuals and goodness-of-fit
  - Model specification
- What is the idea behind the name of ordinary least squares (OLS)?