Last updated January 12, 2025

Quantitative Methods for Public Management II

Professor Information
Name: Mike Denly
Email: mdenly@tamu.edu
Office: Allen 1035
Office Hours: 6 per week
Office Hours Booking: Link
Website: www.mikedenly.com

Course Information
Abbreviation: Bush 635
CRN: 14485
Time: 8:55-11:45am
Room: Allen 1110
Credit Hours: 3
Website: canvas.tamu.edu

1. Course Description

This course provides students with the knowledge that they will need to attain an entry-level research analyst position in the international development space. Most quantitative methods courses that are the second in a sequence for Master's degrees in international affairs and public policy focus mostly on causality/internal validity. By contrast, in this course we complement a focus on causality with an all equal focus on external validity. That secondary focus on external validity is crucial: students will need to be able to use the tools that they learn in this course to answer policy-related questions in their future jobs.

The course begins with an introduction to directed acyclic graphs (DAGs), because we need to learn to draw our assumptions before we draw our conclusions.[1] Then, the course examines selection bias and how to correct for it in experiments. Next, we learn about instrumental variable models and standard natural experiments. In the second part of the course, we examine panel data regression, multilevel models, difference-in-differences, and matching. In the final part of the course, students learn about synthetic control and counterfactual estimators, regression discontinuity designs, and geomapping and spatial regression. The final class also covers ordered outcomes and count models.

To ensure that students can implement what they learn, the course uses a problem-based learning (PBL) model. The first distinctive feature of the course's approach is that students will watch pre-recorded lectures prior to class, and these videos will substitute for textbook readings. If students take handwritten notes on the videos, they may use those handwritten notes for the quiz to start each class. After the quiz, I will release comprehensive lecture notes that summarize the videos. Students will use these lecture notes to complement their own notes when completing in-class group work in randomly-assigned pairs. Group work assignments will entail using `R` and `Quarto` to examine substantive problems in international development using the methods covered each week.

[1] The eminent epidemiologist/biostatistician Miguel Hernán has a free online course on DAGs with this title.

2. Course Learning Outcomes

Upon successful completion of the course, students will be able to:

- Understand and draw causal diagrams, which help clarify implicit and explicit assumptions in modeling processes
- Understand and estimate results for experiments, natural experiments, quasi-experiments, and observational designs in R
- Correct for biases in experiments, natural experiments, quasi-experiments, and observational designs in R
- Generalize and transport empirical results to the population level in R

3. Course Requirements

3.1. Prerequisite Coursework

Student must have taken and passed Quantitative Methods in Public Management I (Bush 631). All other students who wish to take the course must receive permission from the instructor.

3.2. Required Software Credentials

All students who wish to enroll in the course must already be proficient in R and `Quarto`. I will not provide coding instruction in other languages.

3.3. Textbooks and Reading

The course does not have any required textbooks. The free, online video lectures take the place of a textbook, and the professor's comprehensive lecture notes complement the videos. Some weeks, students will also read articles that are freely available to them as well. If students would like a textbook, they may very optionally consult any one of the textbooks below, which I designate as optional reading during some weeks of the course.

3.3.1. Optional Textbooks Not Freely Available Online

- Bueno de Mesquita, Ethan, and Anthony Fowler. 2022. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. Princeton: Princeton University Press.
- Gerring, John, and Dino Christenson. 2017. *Applied Social Science Methodology: An Introductory Guide*. Cambridge: Cambridge University Press.

3.3.2. Optional Textbooks Freely Available Online

- Cunningham, Scott. 2021. *Causal Inference: The Mixtape*. New Haven: Yale University Press.

- Gertler, Paul, Sebastian Martinez, Patrick Prémand, Laura B. Rawlings, and Christel M.J. Vermeersch. 2016. *Impact Evaluation in Practice*. Second ed. Washington, DC: World Bank.
- Huntington-Klein, Nick. 2022. *The Effect: An Introduction to Research Design and Causality*. CRC Press.

3.4. Attendance, Quizzes, and Participation

All students must come to class prepared, having watched the online video lectures and, if applicable, completed the additional reading assignment before class. At the beginning of each class, I will administer a quiz, which serves three purposes.

First, the quiz will help keep track of attendance and serve as a commitment device for students to attend class and on-time. Even if students miss all of the questions on the quiz but are present for class, they will receive full credit toward attendance for the respective class. Overall, attendance will account for 5% of students' final grades.

Second, because students have the option of using their *handwritten* notes from the online videos for the quizzes, the latter should serve as a reward: you should receive 100% every time if you read and take handwritten notes. To give students some cushion for bad days, extenuating circumstances, or university-excused absences, I will drop your lowest 2 scores. I will make no other accommodations students miss class for any reason or arrive late and miss the quiz. In total, students' average quiz score will comprise 25% of your final grade.

Third, the quiz will help ensure students are ready to participate in class discussion as well as the graded group work during class. The material is challenging, and passive learning will generally not suffice for students to perform well in the course.

Because participation comprises 5% of the final grade, I will post a 1-5 cumulative score for the semester on Canvas for each student after the fourth class and gradually update it during the semester, as appropriate. This way, the final participation grade will not come as a surprise to students at the end of the semester, and students may address me early if they have any concerns. When assigning your participation grades, I will consider your contributions to group work and in-class discussions, as appropriate.

3.5. Original Paper or Replication Games Discussion Paper

Students have two options for their final evaluation:

1. Writing an original paper by themselves (see Appendix A for guidelines)
    - Students cannot choose this option without explicit permission from the instructor by January 20, because it involves so much work and the requirements are long (see Appendix A). Indeed, this option is only recommended for students who are considering a PhD after completing this degree.

2. Participating in Replication Games on April 11 and writing a follow-up discussion paper with another student from the class

    - This option is substantially less work and likely the much better choice for most students in the class. By participating in Replication Games, students get a day of excellent free food on April 11 and a truly unique experience. Provided that their paper is of sufficient quality, students will also obtain (a) their own Institute for Replication discussion paper that is published (see mine here); and (b) their name listed as a co-author (along with 100+ other authors) on a meta-analysis publication that will likely go a top journal. If students do not obtain permission to write their own paper by January 20, we will assume that you are participating in Replication Games.

Regardless of which options students choose, they will need to submit a draft and a final version. Students can find more information below.

4. Policies

4.1. Grading

The grading scale below already incorporates very generous grade rounding. Accordingly, there will be no additional rounding of grades under any circumstance.

- >89.5 (A)
- 79.5-89.5 (B)
- 69.5-79.5 (C)
- 59.5-69.5 (D)
- < 59.5 (F)

If you would like to appeal your grade on any assignment, you must make the request to me in writing, over email, within 5 days of receiving your grade. In your grade appeal, you must specify the reason(s) why you think that the assignment is misgraded. Acceptable reasons include those pertaining to the concepts and material covered during the course. I will not consider requests for grade changes that are not germane to the course.

Final grading weights for the individual assignments will be as follows:

- Exams: 20%
- Quizzes: 20%
- Homework Assignments: 20%
- In-Class Group Work: 10%
- Draft Original Paper or Replication Games Paper: 10%
- Final Original Paper or Replication Games Paper: 10%

- Attendance: 5%
- Class Participation: 5%

4.2. Office Hours and Getting Help

This semester, I am expanding my regular office hours to four per week on Mondays and Tuesdays and including two additional office hours on Fridays. The only exceptions to the Friday office hours will be April 4 (conference), April 11 (Replication Games), and April 18 (conference). Most weeks students will thus have access to a minimum of six office hours per week, in addition to the class time that I will dedicate to letting students start their homework and ask me questions. Given that I am expanding office hours so much, please do not email me coding questions and kindly book the office hours in advance using the online booking tool. Of course, if no one has booked the time slot in advance, students may feel free to drop by the professor's office *during the allotted time spot*. Office hours will take place in person, as it is very complicated to resolve coding questions over Zoom. I will not provide office hours help with assignments that are late. If you are unable to attend my scheduled office hours time *due to a class or work conflict*, please email me to book an appointment.

To ensure that students have an option for quick clarifications, there will be Canvas discussion threads for each week of the course. However, the Canvas discussions will generally not be the place for complicated coding help, as office hours is the best medium for such inquiries. Additionally, Canvas discussions will not be monitored regularly over the weekends and outside of regular business hours.

4.3. Absences

It will be very difficult to perform well in the course if students do not attend regularly. The only absences that I will consider legitimate include those pertaining to religious holidays, illness, extenuating circumstances due to an emergency, and university-excused absences (see Student Rule 7). For illnesses, students will need to either provide me with a doctor's note or send me an email before class to inform me that they are sick and won't be attending. If students are sick and do not provide me with a doctor's note or email me before class, I will not excuse the absence except under very extenuating circumstances. An unexcused absence will result in students receiving a 0 on the quiz and the in-class group work assignment.

4.4. Late Homework

Unless you receive prior approval from me, I will not accept late assignments. In other words, all late homeworks will receive a zero.

4.5. In-Class Group Work Policies

Students will work in groups of two for in-class group work. Students will have a different, randomly assigned partner for each class. This way, students gain experience

working with a variety of different people with varying skill levels and working styles. There are two additional ideas behind the random assignment: (1) to avoid selection problems, in which better students leave the others behind; and (2) to better prepare students for the working world, where most junior employees do not get to pick their colleagues.

Both students must submit their assignments on Canvas prior to the end of class, and the assignment must be in the form of a `.pdf` generated from Quarto. Students who do not submit their in-class group assignments prior to the end of class will receive a zero on the respective assignment. Both students will receive the same grade on the assignment, so please both submit the same file.

Given that the group work is designed to be difficult, grading on group work will follow the following scale:

- 100: students completed all questions perfectly
- 95: students completed all questions correctly, except for 1-2 minor errors (e.g., arithmetic)
- 90: students made only one minor comprehension-related error and completed all other questions correctly
- 85: students completed most questions correctly
- 75: students submitted something, but it has major errors

4.6. Homework Assignment Policies

After completing their in-class group work assignments, students must use the respective class time to start on their homework assignments. The latter will be individual assignments—i.e., there will be no group homework. By the same token, students are encouraged to consult their classmates as well as me for any questions on their homework. Indeed, the purpose of starting the homework assignment during class is to ensure that students have a support system to adequately complete the assignments. If students need more time to complete the homework beyond the allotted class period, they will have until 11:59pm the night before the next class to submit the assignment. If students submit the assignment within three days (72 hours) of the end their last class, they will receive two extra points on the respective assignment.

With respect to submission requirements, all students must submit their homework assignments in `.pdf` files generated by `Quarto`. The professor will not accept Word Documents or Google Docs with `R` code and results pasted into the document. Please also ensure that every answer has a complete sentence. In the working world, it is impossible to turn in anything formal without a complete sentence, so it will be no different here.

Homework assignments will be graded weekly. The professor will drop students' two lowest weekly homework assignment scores when calculating the respective portion of the final grade. The professor will not drop additional homework assignment grades for any reason. The grading scheme will follow the same one as in-class group work:

- 100: students completed all questions perfectly
- 95: students completed all questions correctly, except for 1-2 minor errors (e.g., arithmetic)
- 90: students made only one minor comprehension-related error and completed all other questions correctly
- 85: students completed most questions correctly
- 75: students submitted something, but it has major errors

4.7. Exams and Make-up Policy for Exams

Exams will be cumulative and involve open-ended answers. There will be no multiple choice or use of cheat sheets. Per Student Rule 7, students will also only be allowed to make-up exams in the case of university-excused absences, and I will not provide make-up exams for absences that are not university-approved.

4.8. Students' Rights and Responsibilities

- You have a right to a learning environment that supports mental and physical wellness.
- You have a right to respect.
- You have a right to be assessed and graded fairly.
- You have a right to freedom of opinion and expression.
- You have a right to privacy and confidentiality.
- You have a right to meaningful and equal participation, to self-organize groups to improve your learning environment.
- You have a right to learn in an environment that is welcoming to all people. No student shall be isolated, excluded or diminished in any way.

With these rights come these responsibilities:

- You are responsible for taking care of yourself, managing your time, and communicating with the instructor if things start to feel out of control or overwhelming.
- You are responsible for acting in a way that is worthy of respect and always respectful of others.

4.9. Disability Policy

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides reasonable accommodation for their disabilities. If you believe you

have a disability requiring an accommodation, please contact Disability Services. Provided that I receive an accommodation letter from Disability Services, I will be more than happy to accommodate any disability, and I would encourage students to contact me individually with that letter, if applicable. I will not provide disability accommodations without a letter from Disability Services under any circumstances.

4.10. Academic Dishonesty/Plagiarism Statement

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with the definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of the person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism or any other form of academic misconduct, please consult the Aggie Honor System Office website) or the latest version of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty." Always remember: "An Aggie does not lie, cheat or steal, or tolerate those who do."

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at student-rules.tamu.edu/aggiecode. Importantly: "Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

4.11. Generative Artificial Intelligence

Generative Artificial Intelligence (AI) text generators and natural language processing tools, including but not limited to ChatGPT and Claude, are explicitly prohibited for quizzes and exams in this course. The professor also highly discourages the use of these tools to complete in-class group work and Homework assignments, but students may only use generative AI tools for *coding debugging help* as a last-resort measure—i.e., after checking the lecture notes, your classmates, the instructor, and online help forums, etc. In any case, students may not use generative AI tools for the write up of their assignments. Submitting work with a significant percentage of AI-generated content can be considered academic misconduct under Texas A&M University Student Rule 20. Exceptions including pre-existing software additions such as spelling and grammar checkers, which are acceptable. Honestly, it is incredibly easy for the instructor to spot if students use ChatGPT or another generative AI tool, so try do everything yourself. It will pay off in the long run.

4.12. Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking. With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention—including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need. Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS). Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

4.13. Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Graduate school is demanding; you will face many unexpected challenges. Your health and wellbeing, however, are of paramount importance. If you are feeling overwhelmed, stressed, or facing any other obstacle which seems to be getting in the way of your wellbeing and/or academic achievement, resources and help are available both on-line and in-person free of charge for university students. For more information, see caps.tamu.edu.

In the event that you need an in-person physician or dial-a-nurse medical care (including women's health and pharmacy services), please take advantage of the TAMU Student Health

Services. Regardless of your health insurance status, services are available to you as an enrolled student for a very small fee. For more information, visit shs.tamu.edu.

4.14. TAMU Writing Center

The University Writing Center (UWC) is here to help you develop and refine the communication skills important to your success in college and beyond. The UWC provides this help in a welcoming atmosphere that respects all Aggies backgrounds and abilities. Our trained peer consultants are available to work with you on any kind of writing or speaking project, including research papers, lab reports, application essays, or creative writing, and at any stage of your process, whether you're deciding on a topic or reviewing your final draft. You can also get help with public speaking, presentations, and group projects. We can work with you in person at our Evans or BLCC locations or via Zoom or email. To schedule an appointment or to view our handouts, videos, or interactive learning modules, visit writingcenter.tamu.edu. If you have questions, need help making an appointment, or encounter difficulty accessing our services, email uwc@tamu.edu.

5. Class Schedule, Homework, and Videos

Week 1: Directed Acyclic Graphs (DAGs)/Variable Relationships (January 15)

Required Videos:

- Part 1: Motivation
  - Interview with Pascale Schnitzer, Senior Economist at the World Bank [Review]
- Part 2: DAGs and Variable Relationships
  - Bivariate one-way and two-way relationships
  - Forks: close the back door!
  - Chains/mediators: to close or not to close the back door?
  - Colliders: keep the back door open!
  - Irrelevant variables: there is no back door!
  - (Ir)relevant modifiers: no back door but a side door?
  - Unobservable/unmeasured variables: beware of hidden doors!
  - R: Coding basic DAGs
  - R: Capturing the complexity of the social world with more variables

Homework Assignment (due January 21 at 11:00pm):

- **If you are writing an original paper**: use `ggdag` in R to draw a DAG of an X, Y, and two Z variables in a DAG that you would like to examine in a potential paper. Justify why your two Z variables are not mediators or colliders.
- **If you took my course last semester and are NOT writing an original paper**: On the basis of your Dream Job assignment, use `ggdag` in R to draw a DAG of the four variables that you examined. It is fine if any of the variables are mediators or colliders. The most important thing is that you accurately characterize the relationship and complement your DAG with an explanation in words. Make sure to clearly state your variables and remind us how you measured them, as we will not remember your specific variables.
- **If you did not take my course last semester and are NOT writing an original paper**: Use `ggdag` in R to draw a DAG of the following country-level variables:
  - X: democracy (treatment)
  - Y: economic growth (outcome)
  - protection of human rights
  - public infrastructure (e.g., roads, schools, hospitals)

  Complement your DAG with a full explanation in words for your decisions.

Optional Reading:

- Bueno de Mesquita, Ethan, and Anthony Fowler. 2022. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. Princeton: Princeton University Press.
  - See Chapter 10.
- Gerring, John, and Dino Christenson. 2017. *Applied Social Science Methodology: An Introductory Guide*. Cambridge: Cambridge University Press.
  - See Chapter 9
- Bailey, Drew, Alexander J. Jung, Adriene M. Beltz, Markus I. Eronen, Christian Gische, Ellen L. Hamaker, Konrad P. Kording, Catherine Lebel, Martin A. Lindquist, Julia Moeller, Adeel Razi, Julia M. Rohrer, Baobao Zhang, and Kou Murayama. 2024. "Causal Inference on Human Behaviour." *Nature Human Behaviour* 8(8): 1448-1459.
- Rohrer, Julia. 2018. "Thinking Clearly About Correlations and Causation: Graphical Causal Models for Observational Data." *Advances in Methods and Practices in Psychological Science* 1(1): 27-42.
- Hünermund, Paul, Bayers Louw, and Mikko Rönkkö. 2025. "The Choice of Control Variables in Empirical Management Research: How Causal Diagrams Can Inform the Decision." *Leadership Quarterly*.
- Huntington-Klein, Nick. 2022. *The Effect: An Introduction to Research Design and Causality*. CRC Press.

  - See Chapters 6-8

- Cunningham, Scott. 2021. *Causal Inference: The Mixtape*. New Haven: Yale University Press.
  - See Chapter 3
- Humphreys, Macartan, and Alan Jacobs. 2023. "Integrated Inferences: Causal Models for Qualitative and Mixed-Method Research." Cambridge: Cambridge University Press.
  - See Chapter 2

Week 2: Selection Bias and Estimand Challenges in Experiments (January 22)

Required Videos:

- Addressing the fundamental problem of causal inference [Review]
- Potential outcomes framework: basics [Review]
- Potential outcomes framework: key assumptions [Review]
- Potential outcomes framework: estimands and calculations [Review]
- Potential outcomes framework: strata and positivity (CATE)
- Potential outcomes framework: removing selection bias (ATT & ATU)
- Internal vs external validity [Review]
- External validity and mechanisms: basics and definitions [Review]
- DAGs: sample selection bias on the independent variable
- DAGs: sample selection bias on the dependent variable
- DAGs: sample selection bias on a confounding variable
- R: labor market discrimination [Review]
- Validity threats: attrition, noncompliance, and spillover in malaria bed nets [Review]
- R: attrition and balance tests in Brazilian survey experiments on corrupt mayors
- R: non-compliance with human rights in Haiti (CACE/LATE)
- R: spillovers in workfare programs and bicycle allocation in Central African Republic

Required Reading:

- Olken, Benjamin. 2007. "Monitoring Corruption: Evidence from a Field Experiment in Indonesia." *Journal of Political Economy* 115(21): 200-249.
  - Required: Pages 200-221 and conclusion (pages 243-244).

  - Optional: Rest of article, taking into account that this article describes probably the most famous corruption experiment ever undertaken.

Optional Reading:

- Aronow, P. M., Dean Eckles, Cyrus Samii, Stephanie Zonszein. 2021. "Spillover Effects in Experimental Data." *Advances in Experimental Political Science* ed. James Druckman and Donald P. Green. Chapter 16: 289-319. Cambridge: Cambridge University Press.
- Bueno de Mesquita, Ethan, and Anthony Fowler. 2022. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. Princeton: Princeton University Press.
  - See Chapters 4 and 16.
- Deffner, Dominic, Julia Rohrer, and Richard McElreath. 2022. "A Causal Framework for Cross-Cultural Generalizability." *Advances in Methods and Practices in Psychological Science* 5(3): 1-18.
- Degtiar, Irina, and Sherri Rose. 2023. "A Review of Generalizability and Transportability." *Annual Review of Statistics and Its Applications* 10: 501-524.
- Egami, Naoki, and Erin Hartman. 2021. "Covariate Selection for Generalizing Experimental Results: Application to a Large-Scale Development Program in Uganda. *Journal of the Royal Statistical Society, Series A: Statistics in Society* 184(4): 1524-1548.
- Alik-Lagrange, Arthur, Nicolas Buehren, Marcus Goldstein, and Johannes Hoogeveen. 2023. "Welfare Impacts of Public Works in Fragile and Conflict-Affected Economies: The Londö Public Works in the Central African Republic." *Labour Economics* 81(102293): 1-19.
  - Also see the VoxDev podcast.
- Slough, Tara, and Christopher Fariss. 2021. "Misgovernance and Human Rights: The Case of Illegal Detention without Intent." *American Journal of Political Science* 65(1): 148-165.
- Findley, Michael, Kikuta, Kyosuke, and Denly, Michael. 2021. "External Validity." *Annual Review of Political Science* 24: 365-393.
- Hernán, Miguel. 2017. "Selection Bias without Colliders." *American Journal of Epidemiology* 185(11): 1048-1050.
- Pearl, Judea. 2015. "Generalizing Experimental Findings." *Journal of Causal Inference* 3(2): 259-266.
- Tipton, Elizabeth, and Robert Olson. 2018. "A Review of Statistical Methods for Generalizing From Evaluations of Educational Interventions." *Educational Researcher* 47(8): 516-524.

- Lu, Haidong, Stephen R. Cole, Chanelle Howe, and Daniel Westreich. 2022. "Toward a Clearer Definition of Selection Bias When Estimating Causal Effects." *Epidemiology* 33(5): 699-706.
- VanderWeele, Tyler. 2019. "Principles of Confounder Selection. *European Journal of Epidemiology* 34: 211–219.
- Winters, Matthew, and Rebecca Weitz-Shapiro. 2013. "Lacking Information or Condoning Corruption: When Will Voters Support Corrupt Politicians?" *Comparative Politics* 45(4): 418-436.

Week 3: Instrumental Variables (January 29)

Required Videos:

- Overview and assumptions [Review]
- Wald estimator
- First-stage
- Shift-share designs
- Application: in Vietnam an effective counterinsurgency strategy?
- Application: Did China joining the WTO affect the Rustbelt?

Required Reading:

- Acemoglu, Daron, Simon Johnson, and James Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91(5): 1369-1401.

Optional Paper Assignment (Part 1) due February 4 at 11:59pm:

1. If you could study one topic involving a natural experiment or a quasi-experimental design, what would you study and why? Be the specific about the mechanism, setting, treatment, outcome, unit of analysis, and time (M-STOUT) dimensions. Also, be specific about your research design. In Quantitative Methods 1, we learned about difference-in-differences, regression discontinuity, instrumental variables, and matching. However, you are also welcome to propose a standard natural experiment or synthetic control design if you would like to read ahead.
2. Concretely explain how you would measure your dependent variable, why it would be a good measure, and what source you would take your data from—i.e., provide the link. Also, explain whether your dependent variable is continuous, bounded, binary, categorical ordered, and/or censored.
3. Concretely explain how you would measure your independent variable, why it would be a good measure, and what source you would take your data from—i.e., provide the link. Also, explain whether your dependent variable is continuous, bounded, binary, categorical ordered, and/or censored.

4. Concretely explain how you would measure two confounding independent variables (i.e., not mediators, colliders, or irrelevant variables), why they would be a good measures, and what sources you would take your data from—i.e., provide the links. Also, explain whether your variables are continuous, bounded, binary, categorical ordered, and/or censored.
5. Draw a DAG in R using ggdag to capture the relationships among the variables. Explain why they necessarily entail forks.

Optional Reading:

- Angrist, Joshua. 1990. "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records." *American Economic Review* 80(3): 313-336.
- Autor, David, David Dorn, and Gordon Hansen. 2013. *American Economic Review* 80(3): 313-336."The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103(6): 2121-2168.
- Autor, David, David Dorn, and Gordon Hansen. 2021. "On the Persistence of the China Shock." *Brookings Papers on Economic Activity* Fall 2021:381-476.
- Kocher, Matthew, Thomas Pepinsky, and Stathis Kalyvas. 2011. "Aerial Bombing and Counterinsurgency in the Vietnam War." *American Journal of Political Science* 55(2): 201-218.
- Lal, Apoorva, Mackenzie Lockart, Yiqing Xu, Ziwen Zu. 2024. "How Much Should We Trust Instrumental Variable Estimates in Political Science? Practical Advice Based on 67 Replicated Studies." *Political Analysis* 32(4): 521-540.
- Mellon, Jon. 2025. "Rain, Rain, Go Away: 194 Potential Exclusion-Restriction Violations for Studies Using Weather as an Instrumental Variable." *American Journal of Political Science*

Week 4: Standard Natural Experiments (February 5)

Required Videos:

- What counts "as-if random" or "as good as random"?
- The role of qualitative data
- Types of standard natural experiments
- Application: randomized audits in Brazil

Required Reading:

- Hyde, Susan. 2007. "The Observer Effect in International Politics: Evidence from a Natural Experiment." *World Politics* 60(1): 37-63.

Homework Assignment:

- Study for the exam

Optional Reading:

- Titiunik, Rocío. 2021. "Natural Experiments." *Advances in Experimental Political Science* ed. James Druckman and Donald P. Green. Chapter 6, 103-129. Cambridge: Cambridge University Press.
- Dunning, Thad. 2012. *Natural Experiments in the Social Sciences: A Design-Based Approach* Cambridge: Cambridge University Press.
- Callis, Ana, Thad Dunning, and Guadelupe Tuñon. 2024. "Knowledge Accumulation through Natural Experiments." *The Oxford Handbook of Methodological Pluralism in Political Science* Eds. Janet Box-Steffensmeier, Dino Christenson, and Valeria Sinclair-Chapman. Oxford: Oxford University Press.
- Kuffuor, Owura, Giancarlo Visconti, and Kayla M. Young. 2022. Constructing Generalizable Geographic Natural Experiments *Research & Politics* (9)3: 1-7.
- Lyall, Jason. 2019. "Civilian Casualties, Humanitarian Aid, and Insurgent Violence in Civil Wars." *International Organization* 73(4): 901-926.
- Kocher, Matthew, and Nuno Monteiro. 2016. "Lines of Demarcation: Causation, Design-Based Inference, and Historical Research." *Perspectives on Politics* 14(4): 952-975.
- Carnegie, Allison, and Nicolay Marinov. 2017. "Foreign Aid, Human Rights, and Democracy Promotion: Evidence from a Natural Experiment." *American Journal of Political Science* 61(3): 671-683.
- Ferraz, Claudio, and Frederico Finan. 2008. "Exposing Corrupt Politicians: The Effects of Brazil's Publicly Released Audits on Electoral Outcomes." *Quarterly Journal of Economics* 123(2): 703-745.

Week 5: Exam 1 (February 12)

Class:

- Exam

Week 6: Fixed Effects, Interaction, and Effect Modification (February 19)

Required Videos:

- Least-squared dummy variable (LSDV) approach
- Demeaning approach
- Unit roots/stationarity

- Serial correlation
- Interaction [Review]
- The negative weights problem
- Effect modification
- Clustering
- Dynamics: lagging and leading
- Balancing panels
- Robust standard errors (partial review)
- R: Goals at the World Cup and the *ballon d'or*

Homework Assignment:

- TBD

Optional Reading:

- Aronow, P.M., and Cyrus Samii. 2016. Does Regression Produce Representative Estimates of Causal Effects? *American Journal of Political Science* 60(1): 250-267.
- Kropko, Jonathan, and Robert Kubinec. 2020. "Interpretation and Identification of Within-Unit and Cross-Sectional Variation in Panel Data Models." *PLOS One* 15(4): e0231349.
- Imai, Kosuke, and In Song Kim. 2019. "When Should We Use Fixed Effects Regression Models for Causal Inference with Longitudinal Data?" *American Journal of Political Science* 63(3): 467-490.
- Mummolo, Jonathan, and Erik Petersen. 2018. "Improving the Interpretation of Fixed Effects Regression Results." *Political Science Research and Methods* 6(4): 829-835.
- Bell, Andrew, and Kelvyn Jones. 2015. "Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data." *Political Science Research and Methods* 3(1): 133-153.
- Bell, Andrew, Malcolm Fairbrother, and Kelvyn Jones. 2019. "Fixed Effects or Random Effects: Making an Informed Choice." *Quality and Quantity* 53: 1051-1074.
- Baltagi, Badi. 2010. "Fixed Effects and Random Effects." In: *Microeconometrics* eds. Steven N. Durlauf and Lawrence Blume. Palgrave Macmillan. Chapter 10, 59-64.

Week 7: Random Effects and Multilevel Models (February 26)

Required Videos:

- No pooling vs full pooling vs partial pooling
- Random intercept models

- Random slope models
- Mundlak approaches
- Mixed models
- Generalization via multilevel regression with post-stratification (MrP)
- R: Compliance with World Bank social and environmental safeguard policies

Required Reading

- Denly, Michael. 2024. "Preventing the Negative Externalities of Development: Aid Compliance, State Capacity, and Incomplete Contracts." Working Paper.
  - Note: Technically, the model has an ordered dependent variable, so I don't use OLS. For now, ignore that distinction, which we will revisit later in the semester.

Optional Reading:

- Bell, Andrew, and Kelvyn Jones. 2015. "Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data." *Political Science Research and Methods* 3(1): 133-153.
- Bell, Andrew, Malcolm Fairbrother, and Kelvyn Jones. 2019. "Fixed Effects or Random Effects: Making an Informed Choice." *Quality and Quantity* 53: 1051-1074.
- Bell, Andrew, Kelvyn Jones, and Malcolm Fairbrother. 2018. "Understanding and Misunderstanding Group Mean Centering: A Commentary on Kelley et al.'s Dangerous Practice." *Quality and Quantity* 52: 2031–2036.
- Baltagi, Badi. 2010. "Fixed Effects and Random Effects." In: *Microeconometrics* eds. Steven N. Durlauf and Lawrence Blume. Palgrave Macmillan. Chapter 10, 59-64.
- Gelman, Andrew, Jennifer Hill, and Masanao Yajima. 2012 "Why We (Usually) Don't Have to Worry About Multiple Comparisons." *Journal of Research on Educational Effectiveness* 5(2): 189-211.

Week 8: Difference-in-Differences and Event Studies (March 5)

Required Videos:

- Overview: Difference-in-differences [Review]
- R: two-way fixed effects (TWFE)
- R: testing for parallel trends violations
- R: testing for heterogeneous treatment effects
- Staggered adoption/rollouts difference-in-difference designs
- Event studies
- Application: Globalization and anti-immigration sentiment in India

- Application: Decentralization and Recentralization in Vietnam

Required Reading:

- Helms, Benjamin. 2024. "Global Economic Integration and Nativist Politics in Emerging Economies." *American Journal of Political Science* 68(2): 595-612.

Homework:

- TBD

Optional Reading:

- Bueno de Mesquita, Ethan, and Anthony Fowler. 2022. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. Princeton: Princeton University Press.
  - See Chapter 13.
- Malesky, Edmund J., Cuong Viet Nguyen, and Ahn Tran. 2014. "The Impact of Recentralization on Public Services: A Difference-in-Differences Analysis of the Abolition of Elected Councils in Vietnam." *American Political Science Review* 108(1): 144-168.
- Rambachan, Ashesh, and Jonathan Roth. 2023. "A More Credible Approach to Parallel Trends." *Review of Economic Studies* 90(5): 2555-2591.
- de Chaisemartin, Clément, Xavier D'Haultfœuille. 2020. "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects." *American Economic Review* 110(9): 2964–2996.

Week 9: Spring Break (No Class)

Week 10: Matching and Weighting (March 19)

Required Videos:

- What is matching? [Review]
- Choosing a matching method
- Reducing model dependence via data preprocessing
- Positivity and balance diagnostics: standardized mean differences and variance ratios
- Balance-sample size frontier
- Entropy balancing
- External validity via g-computation
- R: Gender Mainstreaming at the World Bank

Required Reading:

- Heinzel, Mirko, Catherine Weaver, and Samantha Jorgensen. 2025. "Bureaucratic Representation and Gender Mainstreaming in International Organizations: Evidence from the World Bank." *American Political Science Review*

Homework Assignment:

- Study for the exam

Optional Reading:

- Ho, Daniel, Gary King, Kosuke Imai, and Elizabeth Stuart. 2007. "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference. *Political Analysis* 15(3): 199-236.
- King, Gary, Christopher Lucas, and Richard Nielsen. 2017. "The Balance-Sample Size Frontier in Matching Methods for Causal Inference. *American Journal of Political Science*
- Greifer, Noah, and Elizabeth Stuart. 2021. "Choosing the Causal Estimand for Propensity Score Analysis of Observational Studies." ArXiv.
- Hainmueller, Jens. 2012. "Entropy Balancing for Causal Effects: A Multivariate Reweighting Method to Produce Balanced Samples in Observational Studies." *Political Analysis* 20(1): 25-46.

Week 11: Exam (March 26)

Class:

- Exam

Week 12: Synthetic Control and Counterfactual Methods (April 2)

Required Videos:

- Synthetic control basics
- Generalized synthetic control
- Fixed effect counterfactual estimators
- R: The consequences of CIA-backed regime change in Latin America

Required Reading:

- Trejo, Guillermo, and Nieto-Matiz, Camilo. 2023. "Containing Large-Scale Criminal Violence through Internationalized Prosecution: How the Collaboration between the CICIG and Guatemala's Law Enforcement Contributed to a Sustained Reduction in the Murder Rate." *Comparative Political Studies* 56(9): 1328-1364.

Optional Paper Assignment (Part 2) due April 1 at 11:59pm:

- Complete first draft of the paper, following the guidelines in Appendix A

Optional Reading:

- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105(490): 493-505.
- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2015. "Comparative Politics and the Synthetic Control Method." *American Journal of Political Science* 59(2): 495-510.
- Grier, Kevin, and Norman Maynard. 2016. "The Economic Consequences of Hugo Chavez: A Synthetic Control Analysis." *Journal of Economic Behavior & Organization* 15: 1-21.
- Xu, Yiqing. 2017. "Generalized Synthetic Control Method: Causal Inference with Interactive Fixed Effects Models." *Political Analysis* 25(1): 57-76.
- Liu, Licheng, Ye Wang, and Yiqing Xu. 2024. "A Practical Guide to Counterfactual Estimators for Causal Inference with Time-Series Cross-Sectional Data." *American Journal of Political Science* 68(1): 160-176.

Week 13: Regression Discontinuity Designs (April 9)

Required Videos:

- Regression discontinuity designs overview [Review]
- Sharp (continuity-based framework)
- Local randomization framework
- Fuzzy regression discontinuity designs
- Geographic regression discontinuity design
- RD Extensions: kink, multi-cutoff, population thresholds

Class:

- Group work

Homework Assignment for April 16:

- None: only participation in Replication Games for students not writing their own paper

Optional Reading:

- Bueno de Mesquita, Ethan, and Anthony Fowler. 2022. *Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis*. Princeton: Princeton University Press.
  - See Chapter 12.
- Cattaneo, Matias, and Rocío Titiunik. 2022. "Regression Discontinuity Designs." *Annual Review of Economics* 14: 821-851.

- Drew Stommes, P.M. Aronow, and Frederisk Sävje. 2023. "On the Reliability of Published Findings Using the Regression Discontinuity Design in Political Science." *Research & Politics* 10(2): 1-12.
- Marioho Bertanha, and Guido Imbens. 2020. "External Validity in Fuzzy Regression Discontinuity Designs." *Journal of Economic and Business Statistics* 38(3): 593-612.
- Dell, Melissa. 2015. "Trafficking Networks and the Mexican Drug War." *American Economic Review* 105(6): 1738-79.

Week 14: Geomapping and Spatial Regression (April 16)

Required Videos:

- Geographic coordinate systems and projections
- Data structures: vectors and rasters
- R: making maps with `ggplot2`, `sf`, and shape files
- Heteroskesdasticity and autocorrelation correction (HAC)
- Conley standard errors, modifiable aerial unit problem, Moran's I
- Uncertain geographic context problem
- R: do natural resources and really cause civil conflict?

Required Reading:

- Denly, Michael, Michael Findley, Joelean Hall, Andrew Stravers, and James Igoe Walsh. 2022. "Do Natural Resources Really Cause Civil Conflict? Evidence from the New Global Resources Dataset. *Journal of Conflict Resolution* 66(3): 387-412.

Optional Reading:

- Darmofal, David, and Christopher Eddy. 2020. "Spatial Data." In: *SAGE Handbook of Research Methods in Political Science and International Relations* eds. Luigi Curini and Robert Franzese. Sage Publications.
- Conley, Timothy. 2010. "Spatial Econometrics." In: *Microeconometrics* eds. Steven N. Durlauf and Lawrence Blume. Palgrave Macmillan. Chapter 33, 301-313.
- Andreas Tollefsen, Håvard Strand, and Halvard Buhaug. 2012. "PRIO GRID: A unified spatial data structure." *Journal of Peace Research* 49(2): 363-374.
- Conley, Timothy, and Morgan Kelly. 2025. "The Standard Errors of Persistence." *Journal of International Economics* 153(104027): 1-22.

Week 15: Ordered Outcomes and Count Models (April 23)

Required Videos:

- Classification
- Linear probability model (LPM)
- Logistic regression: basics
- Logistic regression: coefficients (log odds)
- Logistic regression: coefficients (odds ratios)
- Logistic regression: coefficients (average marginal effects)
- R exercise (part 1): log odds, odds ratios, and average marginal effects

Homework Assignment:

- Complete original paper or replication games paper

Optional Reading:

- Breen, Richard, Kristian Bernt Karlson, and Anders Holm. 2018. "Interpreting and Understanding Logits, Probits, and Other Nonlinear Probability Models." *Annual Review of Sociology* 44: 39-54.
- Diez, David, Mine Cetinkaya-Rundel, and Christopher D. Barr. 2019. "OpenIntro Statistics." Boston: OpenIntro.
  - See pages 163-164.
- Williams, Richard. 2016. "Understanding and Interpreting Generalized Ordered Logit Models." *Journal of Mathematical Sociology* 40(1): 7-20.
- Greenwell, Brandon M. Andrew J. McCarthy, Bradley C. Boehmke, Dungang Liu. 2018. "Residuals and Diagnostics for Binary and Ordinal Regression Models: An Introduction to the sure Package." *R Journal* 10(1): 381-394.
- Bloem, Jeffrey. 2022. "How Much Does the Cardinal Treatment of Ordinal Variables Matter? An Empirical Investigation." *Political Analysis* 30(2): 197-213.

Original Paper/Replication Games Paper Due Date: May 4

Appendix A Questions to Consider for Papers

A.1 All Studies

1. Does the study answer an important question to the world, and does the author justify its importance with a factual argument—as opposed to justifying the topic in overtly normative terms?
2. Does the study contribute to a scholarly literature, and does the author demonstrate sufficient knowledge of that literature to critique it and add to it?
3. Does the study abide by the rules of (descriptive or causal) inference—and contain public procedures, uncertainty estimates, a disinterested posture toward the truth, attention to possible error, and scope conditions?
4. Is the author clear and consistent about the type of relationships, theory, and objectives of the research?
5. Is the writing clear, does the author avoid the passive voice and colloquial language, and are there any grammar issues?

A.2 Quantitative Studies

1. Is the dependent variable in its concept form clear to the reader?
2. Is the principal independent variable in its concept form clear to the reader?
3. Are there cleanly measured, credible data available that clearly map to the dependent variable and independent variable in their concept forms?
4. Is there a falsifiable theory that is formulated at a high level of abstraction?
5. Is there a clear hypothesis that is formulated at a lower level of abstraction than the theory?
6. Does the hypothesis clearly map onto the theory?
7. Is the argument coherent and credible?
8. Are the research design and data appropriate for the research question, theory, and hypothesis?

Appendix B Guidelines

Introduction

Your introduction should be about 2-3 double-spaced pages with the following elements weaved into a coherent text—i.e., no lists:

1. Question build-up or a hook, ending with the research question [1-2 paragraphs]

- A good paper catches the reader's attention early, even if the reader is not normally interested in your topic. Don't go overboard here, though. A "hook" or factual anecdote—not something from your personal life—can be effective. For an excellent example of a "hook", see the first paragraph of Mousa (2020) on promoting social cohesion between Muslims and Jews in the Middle East through soccer.
- Some mentions of literature can be helpful, but only if they are extremely interesting. For example, my paper on foreign aid allocation cites the past literature to start, but the only reason why the opening works is that it brings up something controversial and catches the reader's attention. Basically, don't bore your reader.
- End with a question to guide the research.

2. Why is the question important, and what gaps does it fill in the literature [1 paragraph]
   - Please do not use the word "important" here.
   - Show; don't tell.
   - You will need to have some sense of the past literature to make this part accurate and coherent.
   - References: King, Keohane and Verba (1994, Chapter 1) and Gerring and Christenson (2017, Chapters 1 and 12).
3. Theory/Argument [1-2 paragraphs]
   - I find the graph from Kellstedt and Whitten (2018, 10) to be very helpful here. A theory has more than one level. Think of a Russian doll. At the end of the paragraph, state the lower-level hypothesis.
4. Research Design:
   - Specify quantitative data for your dependent and independent variables at low levels of abstraction. You will revise this part later. [1 paragraph]
5. Findings: Describe your finding [1 paragraph]
6. Implications for Theory and/or Policy: Describe why your findings are important for theory and policy [1 paragraph]
7. Paper structure/Roadmap [1 paragraph]
   - Start with: "This paper proceeds as follows. In Section 1, I....". Don't just use the section titles. Provide a little more detail.

Dependent Variable

When drafting your dependent variable section, pay particular attention to the following:

1. A section heading/title that is NOT "Dependent Variable". The section heading should be your dependent variable at the highest level of abstraction that is relevant for your paper. If you are curious about what I mean, refer to Kellstedt and Whitten (2018, 10).
    - For example, let's say that from an empirical perspective, I am studying bribery levels in the Russian judiciary. In such case, the dependent variable section should be titled "Corruption", because bribery is a form of corruption.
    - Other times, you may not want to go to such a high-level of abstraction. For example, a previous student wrote about whether foreign aid reduces violence in Central America. In this case, the proper level of abstraction to theorize is about concerns "Gang-Driven Violence" or "Violence from Crime" given that much of the violence activity in Central America relates to the drug trade.
2. Defining and *conceptualizing* the dependent variable at the highest level of abstraction that is relevant for your paper
    - Let's say that you are arguing that natural resource income leads to civil conflict, such as in Denly et al. (2022). In this case, your dependent variable is civil conflict, so you would start this dependent variables section by defining and explaining what is civil conflict. For example, what is the threshold number of battle deaths for a conflict to constitute a civil conflict? Is there a difference between civil war and civil conflict? Do different sources use different thresholds on what constitutes a civil war? How many countries have been affected by civil war? Answering such questions helps establish the importance of your topic without just saying that your topic is important.
3. Ensuring the reader understands your dependent variable at lower levels of abstraction, notably how *other* papers measure it.
    - To be crystal clear, the exposition of your dependent variable at a lower level of abstraction should NOT talk about the way you are measuring your lower-level dependent variable, which belongs in your research design. Instead, this is about the different ways that *other* papers are measuring it. This whole exercise is about giving your reader an idea about the different ways to move from the high level of low level of abstraction.
        - To better understand, let's continue with the above example on natural resources and civil conflict. Here, the reader would like to know what types of behaviors are associated with civil conflict. For example, the Armed Conflict Location Event Data (ACLED) measures civil conflict by including protests. However, the Uppsala Conflict Data Program (UCDP) does not take protests into account and only focuses on conflicts where battle deaths excceed a certain threshold number, which is often 1,000. If studies using these different datasets are finding different things, talk about these studies.
4. No need to provide a graph yet, but please try to think about how you would score your cases. In other words, think about the variation in your dependent variable.

- Continuing with the above example on natural resources and civil conflict, think about cases that might help the reader understand civil conflict. Providing that such examples are relevant for your study, is there a difference between what happened in, say, Rwanda in 1994 and Northern Ireland from 1968-1998?

Literature Critique

The Greene (2016) guide provides a terrific roadmap for this section. In particular, remember to:

1. Lead with your own voice: please refrain from Author X says, Author Y says...
    - To lead with your own voice, ensure that you have a strong topic sentence in each paragraph, and also make sure that paragraph is not just a summary of one author's work. I will deduct points when paragraphs are merely just a review of one person's work. A strong literature critique uses others' work to develop their own argument, citing others along the way.
2. This is more of a *critique* than a *review*. I say this because a *review* is generally flat, uninteresting, and bores the reader.
3. Please do NOT mention the title of the article/book mid-sentence anywhere. No exceptions. Use parenthetical citations instead.
    - For example, if I would like to cite a 2015 book written by Rachel Wellhausen in a sentence, I would put Wellhausen (2015). If I wanted to paraphrase an idea from Wellhausen (2015) and put it at the end of the sentence, which is almost always preferable, then I would end the sentence as follows: (Wellhausen, 2015).
4. In total, between your dependent variable section and literature critique, you should have a total of at least 20-25 academic sources—i.e., books and academic articles. Websites and Wikipedia, etc., do not count toward your 20-25 sources. To be clear, sometime it is OK to cite a website or a news article from a reputable source, but these are generally exceptions.

Theory

Again, the Greene (2016) guide is great and suggests:

1. Ensure your theory/argument is clear at both high- and low-levels of abstraction. Trace the mechanisms of your argument so that the reader can understand exactly why your argument is credible. In other words, I am looking for your theory to have mechanisms (or sub-reasons). Recall the example of Russian dolls.
2. Clearly state your hypothesis *at the end(!)*, which should follow directly from your theory.
3. See all points in the Greene (2016) guide.

Research Design

Some crucial components include:

1. The mention of credible, well-measured data that clearly map to the hypothesis, and a clear description of these data and their source. Again, think about the diagram on Kellstedt and Whitten (2018, 10).
2. The mentioning of data that you will use for your dependent and independent variables but also for your control variables
3. A justification of why the data you picked help you answer your research question
4. Some summary/descriptive statistics
5. The method will you be using to test your hypothesis, and a clear justification of why that method is appropriate. Recall that the method is primary a function of your dependent variable
6. See all points in Greene (2016)

Empirical Section

As described the readings, research designs contain numerous components, but here are some ones not to miss:

1. Some description of the method you are using as well as why it is appropriate for your problem
2. Some tables and, preferably, some coefficient plots
3. An interpretation (in words) of your results. Are the results statistically significant in the direction you argument suggest? Are your results substantively signficant?
4. How certain are you about your findings? Recall how this was one of the major things Gerring and Christenson (2017, Chapter 1) and King, Keohane and Verba (1994, Chapter 1) discussed. Hint: look at things such as standard errors, confidence intervals, p-values, R-squared, whether your sample is representative of some broader population, etc.
5. Can your findings be interpreted causally (internal validity)?
    - Hint: it has to do with the method that you use. Recall, in particular, what you learned from Gerring and Christenson (2017, Chapter 10).
6. What is the external validity of your study? In other words, how well do your results generalize to other places/contexts, people, time periods? If you think the results generalize, say where/when and why. If the results do not generalize, why not?

Conclusion

Some crucial elements include:

1. Restate the main results and theory [1-2 paragraphs]
2. Add any contributions for theory and policy, if applicable
3. What you leave for future research, if applicable

Bibliography

Essential elements include:

1. A bibliography made with Mendeley, Zotero, or EndNote
    - It is such a waste of time to make a bibliography from scratch. Additionally, each journal has different citation styles, and you never want to waste time reformatting.
2. As mentioned in Kellstedt and Whitten (2018), you simply don't know the literature well enough if you have less than 20-25 sources from journals or books.

References

Denly, Michael, Michael G. Findley, Joelean Hall, Andrew Stravers and James Igoe Walsh. 2022. "Do Natural Resources Really Cause Civil Conflict? Evidence from the New Global Resources Dataset." *Journal of Conflict Resolution* 66(3):387–412.

Gerring, John and Dino P. Christenson. 2017. *Applied Social Science Methodology: An Introductory Guide*. Cambridge: Cambridge University Press.

Greene, Kenneth F. 2016. "A Primer on Writing Articles for Political Science Journals in the early 21st Century: Basic Organization of Articles with a Causal Argument.".

Kellstedt, Paul and Guy D. Whitten. 2018. *The Fundamentals of Political Science Research*. Third ed. Cambridge: Cambridge University Press.

King, Gary, Robert Keohane and Sydney Verba. 1994. *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton, New Jersey: Princeton University Press.

Mousa, Salma. 2020. "Building Social Cohesion between Christians and Muslims through Soccer in Post-ISIS Iraq." *Science* 369(6505):866–870.

Wellhausen, Rachel L. 2015. *The Shield of Nationality: When Governments Break Contracts with Foreign Firms*. Cambridge: Cambridge University Press.