

POL222 Introduction to Quantitative Reasoning I

Essay Assignment 3

Due: December 8, 2015, 11:59pm

Overview

For this assignment, you will write an essay within 1,700 words in which you discuss the causal theory and the results of multiple linear regression analysis based on one of the case studies provided by the instructor.

A separate document posted on the Blackboard (titled “Essay3_CaseStudies.pdf”) lists eleven cases of multiple linear regression analysis. They are all cross-section observational studies with their unit of analysis being countries around the world in 2008.

Choose one case study that interests you most. Construct a causal theory that explains the dependent variable used in the case with one independent variable as the main causal variable of your theory. Then assume that this case study is the result of your empirical study, and write an essay which reports and discusses your theory and the result of your empirical analysis. More detailed instructions are found below in the “Requirements” section.

For this assignment, you have an option to work and submit the essay in a group of up to three individuals. See the “Collaboration” section below for more details.

Please note that there is no single right answer to each case study. Rather, this essay assignment is an exercise *to make an argument* based on the findings of a linear regression analysis. It is possible that one student proposes a certain causal theory and another student a different theory for the same case study, yet their arguments could be equally convincing. It is also possible that two students propose the same causal theory and discuss similar points for the same case study, yet one paper is better organized and more convincing than the other. Quality of the argument is what matters here.

Goal

In Part III of the class, we covered how we analyze our data using descriptive statistics — especially, linear regression analysis. The goal of this assignment is to deepen and demonstrate your understanding on linear regression analysis through interpreting and discussing a linear regression result as an empirical test of your causal theory. In addition, you are expected to integrate your understanding of the class materials from the earlier parts of the course — a scientific study of politics, major challenges in testing a causal theory in empirical analysis, and empirical research designs — to the current exercise and reflect your understanding in your essay.

Requirements

The requirements are as follows:

1. Within 1,700 words.
2. Write the case study number of the case you have chosen (e.g., “Case Study A1”) at the beginning of your essay (e.g. next to the title or your name).

3. In addition to concise yet informative introduction and conclusion, your essay should have the following three distinguishable parts: i) Theory, ii) Empirical Analysis, and iii) Discussion.
4. In the Theory part of your essay, you should address the followings:
 - (1) An elaboration of your causal theory with a focus on a single independent variable and its causal mechanism.
 - (2) A clear causal hypothesis based on your theory to be tested by a linear regression model.
5. In the Empirical Analysis part of your essay, you should address the followings:
 - (1) A discussion on control variables — independent variables included in the analysis other than the main causal variable for your theory.
 - In particular, why it is appropriate to include these variables as controls should be elaborated.
 - (2) A presentation and interpretation of the results of a multiple linear regression analysis.
 - In particular, the finding of the relationship between the dependent and the main causal variables should be discussed sufficiently.
 - A brief discussion of the finding of the relationship between the dependent and other independent variables (control variables) should also be included.
6. In the Discussion part of your essay, you should address the followings:
 - (1) The possibility of reverse causality/simultaneity.
 - (2) The potential problem of omitted confounding variables.
 - (3) How the results of your empirical research should be interpreted (e.g., Do you claim the relationship you have found is causal? Is there any reservation in interpreting the results?).
7. In this essay assignment, you are not required to use an omitted variable bias formula to identify the sign of the potential bias.
8. In this essay assignment, a linear regression analysis is used as a tool of descriptive statistics — the method to examine the data at hand. It is not used as a tool of statistical inference — the method to estimate the relationship among variables in the population.¹ You do not need to discuss statistical inference for the linear regression results.
9. A table of a linear regression result should be included in your essay. You may edit the table given in the case studies.
10. No additional research or readings are required for this assignment. However, you will need to give appropriate citations and references, if you cite a passage, use ideas, or base your argument on ideas from other sources.

Some of these requirements are further elaborated below.

Requirement 4. The variables included in a linear regression in the case studies are observables — variables that have been already operationalized. So the theory that you will propose should be stated in more general concepts corresponding to the operationalized variables used in the case study. For example, CASE A1 uses the annual GDP per capita growth rate as the dependent variable, and the GDP per capita, the polity score, and the primary school enrollment rate as independent variables. If you choose the GDP per capita as your main causal variable, then your causal *hypothesis* is about how the level of GDP per capita influences the GDP growth rate. Your

¹ Statistical inference will be the main topic to be covered in *POL232 Introduction to Quantitative Reasoning II*.

causal *theory* should be formulated in terms of some general concepts corresponding to these variables — such as the theory on how the level of economic development affects the economic growth rate. The level of GDP per capita and its growth rate can be considered as the operationalization of these concepts.

Requirement 5-(1). You should discuss whether these control variables are confounding variables for your theory. If you argue that they are, you need to elaborate why. You also need to discuss whether you expect these confounding variables to be causally prior or posterior to the main causal variable and elaborate why you want to control for them. If they are not confounding variables, you need to argue that they are other important causal variables to explain the dependent variable and discuss the appropriate causal mechanisms for these variables.

Requirement 5-(2). You should interpret the coefficient for the main causal variable of your theory, and then discuss its *substantive significance* (i.e., your evaluation of the substantive magnitude of the relationship between the dependent variable and the main independent variable). When discussing the substantive significance, you need *to make an argument* rather than merely reporting the computation results.

Requirement 5-(2). Your discussion on the relationship between the dependent and other independent (control) variables should be brief due to space limitations. There would not be much space left after you have elaborated the relationship with your main causal variable. The discussion should still be informative.

Requirement 6. As we previously saw in the class, observational studies by themselves do not demonstrate a causal relationship, as we do not randomly assign the values of the independent variable in such studies. However, it is still possible to claim that the relationship you have found from observational studies is causal, as long as you can provide a convincing argument that you can theoretically eliminate the possibility of reverse causality or simultaneous relationship and that you have included all major confounding variables that are causally prior to the main causal variable of interest. Your conclusion should be more nuanced if you cannot make such an argument. You should provide an argument, which is appropriate and convincing given the theory and the linear regression result. Quality of your argument will be evaluated.

Requirement 7. In Essay 1, you were required to apply the omitted variable bias formula to identify the direction of a potential bias. In this essay assignment, you are not required to do this. The direction of a potential omitted variable bias may be too complicated to identify when we have more than three independent variables. For this reason, I am not asking you to attempt it for this essay assignment.

Null or Opposite Finding

A null or opposite finding of the relationship to the expectation of your causal theory is acceptable for this essay assignment. When the finding is contradictory to your causal theory, then that is the finding you may report and explain in your essay. In this case, you should discuss a possible reason why you have found a contradictory result and what it would mean to the future research on the causal theory that you have proposed. What matters is whether you

provide a reasonable, convincing, clear and logical argument based on your theory and empirical analysis.

Marking Rubric

The marking rubric of the essay assignment is posted on the class Blackboard site together with this document. In addition to the instructions in this document, read the marking rubric carefully, when you prepare your essay.

Format

- Your essay should be within the word count specified above. Footnotes, references or bibliography, and titles and notes of your graphs and figures are not included in this word count.
- Your essay should have a concise yet informative introduction and conclusion.
- Sectioning and sub-sectioning are recommended to effectively organize your essay and communicate your argument to readers. How you effectively organize your essay will be part of the evaluation.
- You may use the three distinguishable parts of the essay required above, Theory, Empirical Analysis, and Discussion, as sections of your essay and add subsections to each as deemed appropriate. You may use different sectioning as long as it is easy to identify these three parts of your essay, which must be presented in this order. For example, you may have two sections for the Theory part, two sections for the Empirical Analysis part, and two sections for the Discussion part but these sections must be presented in the order of Theory sections, Empirical Analysis sections, and Discussion sections.
- Your essay should use standard fonts, such as Times New Roman in 12-point font, and be double-spaced.
- Figures and tables should be placed where they are discussed. If your discussion refers to the same figure or table multiple times, you don't need to insert it every time it's referred. Placing it where it is mentioned for the first time is sufficient.
- Number your figures and tables and give an informative title, such as "Figure 1. Title of the Figure" and "Table 1. Title of the Table." You should use their numbers, such as Figure 1 and Table 1, when you refer to them in your discussion.
- Use footnotes rather than endnotes, if you have something that should be stated but is not appropriate to be included in the body of your essay.
- You need to give appropriate citations and references, if you cite a passage, use ideas, or base your argument on ideas from other sources.
- You may use any citation format as long as it is consistently applied throughout the paper.

Discussion Board

There will be a forum on the essay assignment on the Discussion Board of the class Blackboard site. Please post substantive questions regarding the essay assignment on that forum. The instructor will not respond to substantive questions on the essay assignment via email.

Check the Discussion Board regularly since there may be answers to important questions, which may be critical for completing this essay assignment.

Questions on the essay assignment posted on the Discussion Board will be answered on Mondays, Wednesdays, and Fridays until the due date.

Office Hours

In addition to the instructor's regular office hours, there will be extra office hours held by teaching assistants. If you want to discuss or seek advice on the essay assignment, stop by during these office hours. You may visit any teaching assistant's office hours regardless of who your tutorial instructor is. Schedule and location of teaching assistants' office hours will be announced in the "Office Hours" section of the class Blackboard site.

If you want to seek advice on your essay assignment yet have schedule conflicts with all available office hours, you may send an email to the following teaching assistant: Michael Gavin at michael.gavin@mail.utoronto.ca. Please consider visiting office hours first, as the feedback of this kind may be best communicated in person. You should consider seeking advice via emails from Mike only when your schedule does not allow visiting the available office hours.

Please note that neither the instructor nor teaching assistants will be able to review your draft essay when you seek advice.

Collaboration

For this essay assignment, you have an option to work and submit the essay in a group of up to three individuals. Collaboration in a team of multiple scholars is not unusual for contemporary social science research in general, and quantitative empirical political science research in particular. As an essay assignment for a course on the methods of such research, this assignment provides you with an option to practice scholarly collaboration.

If you choose to submit your work as a group, designate a corresponding author. Only the corresponding author should submit the essay to Turnitin.com. The coauthored essay should clearly state the names and student numbers of all students in a group at the beginning of the essay.

If you submit your work as a group, everyone in the group will receive the same mark. Please note that both group and individual submissions will be treated equally. There is neither bonus nor penalty in working individually or in a group.

If you work on an essay individually, you may discuss the case study of your choice with your classmates, only when you and your peers do not write an essay on the same case study. More specifically, the acceptable form of collaboration is that you work on a different case study from your peers', and mutually review and critique each other's causal theory/hypothesis and empirical analysis. Discussion with your classmates if you both work on the same case study should be avoided and may result in an academic misconduct. This is because your essays may show significant similarities to each other's, such as important parts of your essay being based on someone else's idea, or the same idea being used by both students. Please note that "(w)orking too closely with another student on an individual assignment so that the end result is too similar"

is considered as an example of the academic misconduct under the University of Toronto's *Code of Behaviour on Academic Matters*.² You are asked to write an original essay of your own.

Assignment Submission

Your essay should be submitted to Turnitin.com. If you choose not to use Turnitin.com, please let the instructor know well before the deadline to make an alternative arrangement.

As suggested above, if you submit an essay in a group, only one person from the group, designated as a corresponding author, should submit the essay to Turnitin.com. Do not forget to include everyone's name and student number at the beginning of the essay.

To upload your essay to Turnitin.com, please refer to:

<http://teaching.utoronto.ca/ed-tech/teaching-technology/turnitin/a-guide-for-students/>

You also need the following information:

Class ID: 10781470

Password: introquant

² The quotation is from "What is Academic Misconduct" (<http://www.artsci.utoronto.ca/osai/The-rules/what-is-academic-misconduct>) at the Office of Student Academic Integrity's website. See "Unauthorized aid or assistance."