Econometrics
University of Toronto
Department of Economics
Assignment 02

1. Assignment Overview

1.1. Aim of Assignment

Assignment 2 entails applying the econometric and empirical tools learned throughout the course to a simple well-defined question. While Assignment 1 acquainted you with the main building blocks of coding and analyzing data to answer a series of specific questions, Assignment 2 will expand on that process, and your final analysis will be structured and organized like a short term paper. That said, the work will be significantly less than a term paper. Similar to assignment 1, you will be provided a context and data upon which to base your submission, and furthermore, the assignment requirements and scope are tightly defined (see below) meaning there is less leg work in refining your own question (and data) and less range for missing the mark in your execution. The aim is that the tight scope will give you practice in coding, analyzing, and writing about econometric findings in a more formal format, which can better prepare you to write subsequent papers in other courses (e.g. Eco 475).

Our focus for the assignment this year will be a panel of data on guns and crime for U.S. states. A complete description of the data and topic is given in the Context and Data section below.

1.2. Structure of Assignment

A "finished product" will be comprised of a concise abstract; at least two tables: (1) descriptive statistics, and (2) regression results; and no more than 5 pages (1.5-spaced) of corresponding text (in 12 point font) outlining and interpreting the empirical results. The assignment should be organized as follows:

Page 1: **Title page**
Including course and student information, and a concise abstract.

Page 2-6: **Text**
Formal academic composition with a 5 page limit, 12 point font, and 1.5 line spacing. The text should NOT include tables or figures.

Page 7: **References**
Includes a list of any references cited in your assignment.

Page 8- : **Tables and figures**
Tables and figures are appended after the list of references. At minimum, this will include two tables, but you may include additional tables and figures where appropriate. All included tables and figures must be discussed in the text. DO NOT include undigested STATA output! Results presented in tabular form should have all variables and numbers clearly labeled. Figures should also be well labeled and clear. Consider each Table/Figure as a stand-alone product, which can be largely understood on its own (i.e. without referring to the text).

Overall, the assignment should demonstrate application of tools discussed throughout the course, but especially those from Chapters 13 and 14.

1.3. Due Date and Submission Details

Assignment submission has two main parts:
Part 1: Your answers submitted on Crowdmark (details below). This is for grading only.

Part 2: The same work submitted on Quercus (details below). This is to check your Stata support files and to run your work through Turnitin.
You must verify (the correct version of) your work was submitted before the deadline. Details in the links below. You can keep resubmitting until the deadline.

- https://crowdmark.com/help/verifying-that-an-assignment-was-submitted/
- https://ctl1.utsc.utoronto.ca/quercus/help/Uploading_an_assignment_to_Quercus.pdf

Use Chrome, clear your cache, restart your browser/computer, close all other tabs and programs before submitting your work.

1.3.1. Part 1: Crowdmark submission

Location: Crowdmark: https://app.crowdmark.com/sign-in.
Submission available: Wednesday Dec 9th at 7:00PM
Due date: Wednesday Dec 16th at 7:00PM
Late Penalties: 100% penalty per 1-minute past Wednesday Dec 16th at 7:00PM.
File Format: Complete your work in Microsoft Word. Convert it into a pdf file and submit a pdf file.
General Instructions:

- Your answers must be TYPED. Any handwritten answers will get zero points.
- Follow the required format described in the Assignment Instructions (this document).
- Verify your submission: https://crowdmark.com/help/verifying-that-an-assignment-was-submitted/ . This is especially relevant if you are having connection issues.

1.3.2. Part 2: Quercus submission

Location: Quercus Assignments: https://q.utoronto.ca/courses/182219/assignments/484522
Submission available: Wednesday Dec 9th at 7:00PM
Due date: Wednesday Dec 16th at 7:00PM
Late Penalties: 100% penalty per 1-minute past Wednesday Dec 16th at 7:00PM.
File Format: One Microsoft Word file. One Stata do file. One Stata log file.
General Instructions:

- Your answers must be TYPED. Any handwritten answers will get zero points.
- No images must be embedded into your file. If you do embed images your file will not process through the required checks and you will get a zero.
- Your answers must be in English without any other languages embedded in the file. Again, this will be an automatic zero if we cannot process the file through the required checks because of this.
- Verify your submission, including whether you have submitted the correct file: https://ctl1.utsc.utoronto.ca/quercus/help/Uploading_an_assignment_to_Quercus.pdf (scroll down to part 3). This is especially relevant if you are having connection issues.

1.3.3. Plagiarism

Plagiarism is a serious problem (in general) with university writing. Obviously, if we detect this form of academic dishonesty, we deal with it severely. Even "inadvertent" plagiarism is penalized. You should familiarize yourself with the rules regarding the citation of sources, etc. A note on Academic integrity is posted on the course website.

2. Assignment Details

2.1. The Context and Data

Context: the topic and question is based on the following paper:

Ayres, Ian and John J. Donohue III. "Shooting Down the More Guns, Less Crime Hypothesis." 55 Stanford Law Review 1193 (2003).

This paper analyzes (among other things) a balanced dataset on U.S. states over the period of 1977-1999. During this period some U.S. States enacted laws that allow citizens to carry concealed weapons. These laws are known as "shall-issue" laws: they instruct local authorities to issue

concealed weapons permits to all applicants who are citizens, are mentally competent, and have not been convicted of a felony.

The core focus of your assignment will be to analyze the effect of concealed weapons laws on violent crimes. In theoretical terms, one could argue that if more people carry concealed weapons, crime will fall because criminals are deterred from violent interactions with others. On the other hand, one could argue that crime will increase because there is more opportunity to use weapons.

Of course, more details on this topic can be found through a literature search (which will obviously include the paper cited above). Your job is to study this question and analyze this relationship empirically using the attached data.

murder& robbery all defined as violent crime

Data: the dataset includes the following variables with definitions as indicated:

Variable	Definition
vio	violent crime rate (incidents per 100,000 members of the population)
rob	robbery rate (incidents per 100,000)
mur	murder rate (incidents per 100,000)
shall	= 1 if the state has a shall-carry law in effect in that year = 0 otherwise
incarc_rate	incarceration rate in the state in the previous year (sentenced prisoners per 100,000 residents; value for the previous year)
density	population per square mile of land area, divided by 1000
avginc	real per capita personal income in the state, in thousands of dollars
pop	state population, in millions of people
pm1029	percent of state population that is male, ages 10 to 29
pw1064	percent of state population that is white, ages 10 to 64
pb1064	percent of state population that is black, ages 10 to 64
stateid	ID number of states (Alabama = 1, Alaska = 2, etc.)
year	Year (1977-1999)

2.2. Content requirements

Following the overall structure outlined in section 1.2, your assignment should read like a mini term paper. That said, the content requirements and scope in this assignment are tightly defined and should follow the guidelines below.

2.2.1. Overall Guidelines

Your analysis will focus on the relationship between concealed weapons laws and violent crimes.

1. **Base:** your assignment will include analysis and write up on the relationship between the log of the violent crime rate (ln(*vio*)) and shall-issue laws (*shall)*. It should include specifications according to the detailed guidelines below.
2. **Extension:** your assignment should include an extension to the base analysis in 1, where the choice of extension is up to you. Some examples of appropriate extensions are as follows: analyzing other types of crime, including state specific trends, including a graphical analysis showing the crime rates across states depending on shall-issue adoption status, or any other extension inspired by your reading on this issue (e.g., conceivably there is fertile ground in subsequent research on this topic…).

2.2.2. Detailed Guidelines

At a more granular level, your analysis should:

1. Specify the base equation to be analyzed (in equation form), including a brief introduction / motivation based on related literature.
2. Explain and outline the hypotheses that you plan on testing. You must specify your own hypotheses, explain why they are potentially interesting, and sketch the mechanics of how you

plan to implement the tests.

3. Briefly describe the data, with reference to a table of descriptive statistics (means, etc.)
   a. This table must be named Table 1, be included on page 8, and must contain summary statistics like the means, s.d.'s for all variables used in the analysis. If appropriate to your chosen direction in **2. Extension**, you may include summary statistics for cuts of the data.
   b. Means and standard deviations allow you to put the size of estimated coefficients in context. A well-written analysis will discuss summary statistics as a prelude to the main point of the analysis and will use summary statistics to put the size of estimated effects in context (e.g. what does a 3 percent increase in y represent from mean levels?).

4. Report and discuss regression estimates from a variety of pertinent specifications.
   a. Reporting:
   For the **1. Base** specification, run and report regression results in Table 2 for four different specifications: simple regression of ln(*vio*) on *shall;* a regression of ln(*vio*) on *shall*, and controls: *incarc rate, density, avginc, pop, pb1064, pw1064, pm1029;* a regression of ln(*vio*) on *shall*, controls, and state fixed effects; and a regression of ln(*vio*) on *shall*, controls, state and year fixed effects. This table should be formatted as thus and contain at its core the following:

Table 2: Regression Analysis of the log of the violent crime rate and shall-issue laws

	(1)	**(2)**	**(3)**	**(4)**
Shall	estimate (s.e.)	estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
incarc_rate		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
density		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
avginc		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
pop		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
pb1064		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
pw1064		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
pm1029		estimate (s.e.)	estimate (s.e.)	estimate (s.e.)
State Effects	No	No	Yes	Yes
Time Effects	No	No	No	Yes
Clustered s.e.'s	No	No	Yes	Yes
Other statistics you wish to report: *F*-Statistics and *p*-values testing exclusion of groups of variables, etc				
…	…	…	…	…

For the **2. Extension** specification, tabular reporting should be of a similar format. Any Figures should include explanatory notes and labeling.

   b. Discussion of results:
   Be sure to interpret key coefficients, as well as the results of the hypothesis tests. For example, in your discussion of results be sure to mention:
   - The size of the estimates in practical terms.
   - When adding a set of control variables, discuss whether the estimated coefficient change in terms of both: statistical significance and practical significance.
   - Discuss what happens when moving to specification (2) to specification (3). For

1 model <-> 4 specifications

extension: data description, estimation and discussion

example, what is an example of a time invariant (or nearly so) omitted variable that varies across state? This can be used to anchor the general discussion. Consider also how results change when adding time effects and why this might be the case.

- Use similar discussion points when considering the results from your chosen 2**. Extension.**

c. Interpretation of results:
Discuss possible problems with your specification, especially omitted variables that may lurk in the residual (i.e. do you interpret your results as causal or are they purely descriptive?). What are the most important remaining threats to the validity of your regression results?

d. Conclusion:
Based on your analysis what conclusions would you draw about the effects of concealed weapons laws on these crime rates.

2.3. Evaluation

There is no mechanical grading scheme. But the following should be a helpful guide to my preferences, and explain in more detail what we are looking for in your submission.

Exposition and Writing (Approximately half the weight)
You will need to explain your empirical results to your reader. This involves: describing the data; motivating the regression; clearly explaining what is estimated; posing and interpreting hypotheses; and linking results to the existing literature. It is not always easy to disentangle "exposition," from "content", but please note that **readers (i.e., the professor and TA) will never be expected to extract content from poor exposition.**

Key elements of clear exposition include:

1. Placing results in context (i.e. discuss "economic" significance)
   - Discuss up front (in introduction) and come back to it later (in the results section)
   - Relate estimates to those in the literature

2. Data description (concerning Table 1)
   - How are the variables distributed?
   - Does anything hint at the subsequent empirical results?

3. Base regression: explain, interpret
   - Construction of variables
   - Specify and motivate hypotheses
   - Mapping coefficients into interpretation

4. Additional hypotheses explained
   - Motivate additional regressions and hypotheses (as opposed to randomly/arbitrarily selected coefficients)

5. Quality of the tables
   - We will penalize (heavily!) undigested STATA output (i.e. tables do not look like STATA output).
   - Tables should (ideally) have "English" variable names, not acronyms
   - Ask yourself: "If I had never seen this table before would I still understand what it is about?"

6. Integration of empirical results from tables to text, and linkages to article.

7. Overall writing and coherence
    - Does the assignment draw results together?
    - Is it clear to read?
    - Usually, a confusing assignment reflects underlying confusion.

Content (Approximately half the weight)
It is not easy to separate exposition from content, but here are some general characteristics we will be looking for as we assess your execution of the content guidelines:

1. Summary of the literature and question posed.

2. Base regression: explanation, interpretation

2. Estimation and discussion of additional regressions/extensions
    - Implementation of hypothesis tests and interpretation
    - If using interactions and/or dummy variables, make sure that the interpretation and specification is correct (i.e., relative to a base group)

3. Potential statistical problems
    - Be sure to discuss why/how a data problem might affect results (as opposed to just stating a problem might exist).