Econometrics III, ECON 491
Department of Economics
St. Francis Xavier University
Winter 2018

Instructor: Teng Wah LEO

Time Blocks and Location: ($G3/H3/J3$) 2:15 p.m. to 4:00 p.m. LIB08.

Office Hours: Tuesday, 10 a.m. - 12 noon; Wednesday from 10 a.m. - 2 p.m.

Objective: The course is designed as a continuation from Econometric Method I, with a strong focus on applied econometrics. The principal idea is to provide practical experience in

1. Obtaining data,

2. Deciding an appropriate statistical model,

3. Perform necessary statistical analysis,

4. Perform diagnosis of issues, &

5. Writing academic reports/papers.

The foreseen immediate benefit would be a more fruitful thesis writing experience, and it has additional benefits should the student pursue graduate degrees in Economics, and/or Statistics and its attendant subfields.

To achieve these objectives, the course will introduce relevant and common current models, up to the intermediate level. The understanding required of the statistical ideas are conceptual, and the students are encouraged to take ECON 372, Econometrics II, to acquire the theoretical knowledge, and programming skills. Here the principal statistical software used will be STATA, which remains the most commonly used statistical software.

The statistical models used include the following:

1. Instrumental Variable Estimation

2. Panel Data Methods

3. Limited Dependent Variable Models

4. ARIMA Models

5. ARCH, GARCH, & VAR Models

6. Cointegration & Vector Error Correction Models

Prerequisite: ECON 371.

Evaluation: There will be four equally weighted take home tests each amounting to 15%, and a final project which the student can use toward her/his thesis, and will be worth 40%.

Depending on the size of the class, the class discussion will be the primer for each of the assignments. Each student will be expected to present their assignment findings at least twice, once for an assignment, and the second for the final project. The final project can be an extension of the assignments, or the beginnings of the student's thesis. The purpose of the presentations are primarily to acclimatize them to public speaking in preparation for their job search, and graduate school applications.

Each class will spend the first hour discussing the basic concept underlying a particular statistical model under consideration, building up the key statistical equations, and their attendant concerns. The latter two hours will be spent performing the statistical analysis using a specific data which the student has to prepare for use themselves. All analysis will be performed using STATA.

Required Text:

1. (**CB**) Christopher F. Baum. 2006, *An Introduction to Modern Econometrics Using Stata*, Stata Press.

2. (**SB**) Sean Becketti. 2013, *Introduction to Time Series Using Stata*, Stata Press.

3. Jeffrey M Wooldridge. 2015, *Introductory Econometrics: A Modern Approach*, South-Western College, 6th edition.

Supplemental Text:
Simona Boffelli and Giovanni Urga. 2016, *Financial Econometrics Using Stata*, Stata Press.

Detailed Course Outline:

1. Data Acquisition: Weeks 1 -2

   (a) Discuss how to obtain data from various publicly available sources. The data set obtained will be the basis for the practical use of the STATA commands in the rest of the course.:

   - Integrated Public Use Microdata Series (IPUMS); University of Minnesota: `https://www.ipums.org/`.

   - Panel Study of Income Dynamics (PSID); University of Michigan: `http://psidonline.isr.umich.edu/`.

   - National Longitudinal Study of Adolescent to Adult Health (Add Health): University of North Carolina at Chapel Hill: `http://www.cpc.unc.edu/projects/addhealth/`

   - Carolina Population Center, University of North Carolina at Chapel Hill: `http://data.cpc.unc.edu/`

   - European Social Survey (ESS): `http://www.europeansocialsurvey.org/`

   - World Bank Data: `http://data.worldbank.org/`

   - Federal Reserve Economic Data (FRED): Federal Reserve Bank of St. Louis: `https://fred.stlouisfed.org/`

   - International Monetary Fund (IMF) Data: `http://www.imf.org/en/Data`

   (b) Summarizing Data

   - Using `summarize` & `tabulate` commands in STATA to examine the feature of the data, and detecting potential issues such as missing and outlier data points, low response rates in surveys.

   - Use of `outreg` & `outreg2` to change STATA output to text file.

   (c) Graphing of Data: Use of `graph` command in STATA and the examining the variety of graphs it can plot, including line plots, scatter plots, pie charts, histograms, etc.

2. Microeconometrics: Weeks 2 - 7

   (a) Discuss the commands for handling *Heteroskedasticity* using the `robust` and `cluster` options in STATA commands.

   (b) Discuss the four types of weights used in STATA to handle surveys; `fweight`, `pweight`, `aweight`, and `iweight`, as options in the different commands in general.

   (c) Revise concerns with the issue of *Endogeneity*, and develop the use of Instrumental Variable Regression to handle it. (**CB, Chapter 8**)

      • Using `ivreg` command in STATA to perform Instrumental Variable regression.

      • Using `hausman` command in STATA to perform Hausman Test.

      • Performing Overidentifying Restriction Test.

   (d) Discuss the difference between Cross Sectional versus Panel Data, and the suite of `xt-` commands to handle Panel Data estimation. (**CB, Chapter 9**)

      • Using `xtset` to declare a dataset as Panel Data in Stata.

      • Modelling of Fixed and Random Effects Models.

      • Application of Instrumental Variable Regression to Panel Data.

      • Application of Seemingly Unrelated Regression (SUR) Models.

   (e) Discuss the use of Discrete Choice (Logit & Probit) Models to handle Discrete Responses. (**CB, Chapter 10**)

      • Use of `logit` & `probit` command to perform standard Logit and Probit Model regressions. Using `mfx` command to obtain marginal effects after regression.

      • Use of `mlogit` & `mprobit` command to perform multinomial Logit and Probit regressions for categorical variables.

      • Use of `ologit` & `oprobit` command to perform ordered Logit and Probit regresssions for ordered response variables.

      • Use of `nlogit` command to perform nested Logistic Model regression.

      • Discuss issues associated with censored or truncated data, and the use of `tobit` command to perform regressions under these circumstances.

(f) Discuss the use of Poisson Regression in *Count Data* & it generalization in Negative Binomial Regression Models. (Time Permitting)

- Use of `poisson` for Poisson Regression.
- Use of `nbreg` for Negative Binomoial Models.

3. Macroeconometrics & Time Series: Weeks 8 - 13

(a) Discuss the difference in the data matrix for Time Series versus the other data structures, and the use of `tsset` command to declare a dataset as Time Series data in STATA.

(b) Autoregressive (AR), Moving Average (MA), Autoregressive Integrated Moving Average (ARIMA) Models. (**SB, Chapters 5, 6 & 7**)

- Using `corrgram`, `ac`, & `pac` to determine the order of *integration*.
- Using `arima` command to perform AR, MA, ARMA, and ARIMA models.
- Forecasting with ARIMA models.

(c) Discuss the use of Generalized Autoregressive Conditional Heteroskedastic (ARCH & GARCH) Models to model time varying volatility. (**SB, Chapter 8**)

- Use of `arch` command.
- Forecasting with GARCH models.

(d) Discuss the use of Vector Autoregressive (VAR) Models to model a system of equations that model an Economy; Multiple Time Series. (**SB, Chapter 9**)

- Discuss the use of `var` command in STATA.
- Performing Granger Causality Test.
- Interpretion of Results from Analysis.

(e) Testing for Nonstationary Time Series (Cointegration), & the Application of Vector Error Correction (VEC) Models. (**SB, Chapter 10**)

- Use of `vec` command.