Wayne State University - Department of Economics
ECO 6100 (001) 10741- Introduction to Econometrics (Fall 2018)

Instructor: Vitor Kamada
Class: MW, 7:30 - 09:10 pm in 8 PREN
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Office hours: MW, 4:10 – 5:40 pm, or by appointment.

1) Course Description

This course introduces several statistical and econometric methods that are frequently used in economic consulting, big corporations, nonprofit organizations, academic research, etc. An important emphasis is put on practical application and on the use of Python Computer Language to analyze real-world datasets. The first part of this course covers causal inference; whereas the second part covers forecasting techniques applied mainly to Finance.

2) Learning Outcomes

The main goal of this course is to develop statistical and econometric reasoning. Econometric reasoning involves understanding the logic behind the econometric procedures and being able to fully interpret the results. Furthermore, after this course students will become proficient in using Python to perform a variety of statistical and econometric analysis, specially forecasting economic variables.

3) Recommended Material

Angrist, J. D. and Pischke, J. (2014). Mastering 'Metrics: The Path from Cause to Effect, Princeton University Press.

Diebold, F. X. (2017). Forecasting in Economics, Business, Finance and Beyond. Available for free at: https://www.sas.upenn.edu/~fdiebold/Textbooks.html

Lifelines (2018). Survival Analysis Documentation available for free at: https://lifelines.readthedocs.io/

Quantopian (2018). Lectures available for free at: https://www.quantopian.com

Rey, S. J. and Arribas-Bel, D. (2018). Geographic Data Science with PySAL. Available for free at: http://darribas.org/gds_scipy16/

Sargent, T. J. and Stachurski, J. (2018). Lectures in Quantitative Economic. Available for free at: https://lectures.quantecon.org/py/

Sheppard, K. (2018). Introduction to Python for Econometrics, Statistics and Data Analysis. Available for free at: https://www.kevinsheppard.com/Python_for_Econometrics

4) Required Software

4.1) Anaconda Distribution

It is a free Python distribution that includes 1,000+ data science packages. Installing Anaconda is straightforward, download it at: https://www.anaconda.com/download/ . Inside Anaconda, we are going to use the Spyder, an integrated development environment (IDE) for scientific programming.

4.2) Quantopian

We can run Python code online at Quantopian website (https://www.quantopian.com). However, we cannot load external data or packages, that's why you must install Anaconda in your Laptop. The advantage of Quantopian is that we can perform econometric analysis in expensive proprietary data for free, but we cannot download the data. In Quantopian, for example, we can access Corporate Fundamental Data from Morningstar, and clean Twitter Trader Mood data from PsychSignal. Just few years ago, PhD students and business analysts used to dream with the possibility to access this type of data for free. Please, create a personal account at Quantopian, it is free.

4) Course Schedule

Date	Topics/Key Concepts
Week 1 **Aug 29**	**1) Randomized Trials** Angrist and Pischke (2014): Ch 1
Week 2 **Sep 3**	**Labor Day**
Week 2 **Sep 5**	**2) Linear Regression** Quantopian (2018): Lecture 12
Week 3 **Sep 10**	**3) Multiple Linear Regression** Quantopian (2018): Lecture 15
Week 3 **Sep 12**	**4) Model Misspecification** Quantopian (2018): Lecture 17
Week 4 **Sep 17**	**5) Omitted Variables Bias** Angrist and Pischke (2014): Ch 2
Week 4 **Sep 19**	**6) Instrumental Variables (IV) and Local Average Treatment Effect (LATE)** Angrist and Pischke (2014): Ch 3.1 and 3.2

Week 5 **Sep 24**	**7) Two-Stage Least Squares (2SLS)** Angrist and Pischke (2014): Ch 3.3 Sargent and Stachurski (2018): Ch 4.3
Week 5 **Sep 26**	**8) Sharp Regression Discontinuity Design** Angrist and Pischke (2014): Ch 4.1
Week 6 **Oct 1**	**9) Fuzzy Regression Discontinuity Design** Angrist and Pischke (2014): Ch 4.2
Week 6 **Oct 3**	**10) Difference-in-Difference (DiD)** Angrist and Pischke (2014): Ch 5.1
Week 7 **Oct 8**	**11) Fixed Effects** Angrist and Pischke (2014): Ch 5.2
Week 7 **Oct 10**	**12) Multifaceted Investigation of the Causal Effect** Angrist and Pischke (2014): Ch 6
Week 8 **Oct 15**	**13) Residual Analysis -Heteroscedastic** Quantopian (2018): Lecture 18
Week 8 **Oct 17**	**14) Residual Analysis – Autocorrelation** Quantopian (2018): Lecture 18
Week 9 **Oct 22**	**15) Poisson Regression** Sargent and Stachurski (2018): Ch 4.4
Week 9 **Oct 24**	**16) Beta Hedging** Quantopian (2018): Lecture 31
Week 10 **Oct 29**	**17) Sentiment Analysis** Quantopian (2018): Tutorial 1, 2, 3, and 4
Week 10 **Oct 31**	**18) Estimation of Capital Asset Pricing Model** Quantopian (2018): Lecture 30
Week 11 **Nov 5**	**19) Integration, Cointegration, and Stationarity** Quantopian (2018): Lecture 43
Week 11 **Nov 7**	**20) Cointegrated Pairs Trading** Quantopian (2018): Lecture 44
Week 12 **Nov 12**	**21) Futures Contracts** Quantopian (2018): Lecture 51
Week 12 **Nov 14**	**22) Mean Reversion on Futures** Quantopian (2018): Lecture 53
Week 13 **Nov 19**	**23) Draft Empirical Report**
Week 13 **Nov 21**	**Holiday - No Classes**
Week 14 **Nov 26**	**24) Introduction to Survival Analysis** Lifelines (2018): Kaplan-Meier Survival Function and Hazard Rates
Week 14 **Nov 28**	**25) Survival Regression** Lifelines (2018): Cox Proportional Hazard Model

Week 15 **Dec 3**	**26) Introduction to Spatial Econometrics** LeSage (2008). Revue d'économie industrielle
Week 15 **Dec 5**	**27) Spatial Econometrics with PySAL** Rey and Arribas-Bel (2018): Part I and II
Week 16 **Dec 10**	**Study Day**
Week 16 **Dec 12**	**Final Exam** **Empirical Report**

5) Grading

5.1) Your final grade will be assessed as follows:

Assignment	Weight	Date
Surveys*	1%	Wednesday, Sep 26 (at 4:00 pm)
Homework	25%	Check on Canvas
Quizzes	10%	Check on Canvas
Lab	45%	Check on Canvas
Empirical Report	19%	Wednesday, Dec 12
Total	100%	

* You can answer the surveys "Demographics and Study Methodology" and "Early Course Evaluation" on Canvas.

Grading Scale

94+ = A
90+ = A-
87+ = B+
84+ = B
80+ = B-
77+ = C+
74+ = C
70+ = C-
67+ = D+
64+ = D
61+ = D-
Below 61 = F

5.2) Instructions for Surveys, Homework, Lab, and Empirical Report

Guidelines and detailed instructions about Surveys, Homework, Lab, Empirical Report are available on Canvas.

5.3) Makeup Policy for any Assignment

If you miss any Assignment, I will provide a makeup activity in the case of an excused and unavoidable absence. Then it is YOUR RESPONSIBILITY to provide satisfactory written documentation of an excused and unavoidable absence as soon as possible. For example, if you are ill – the accompanying doctor's note must say that you cannot (or could not) do the Homework or Lab. If the doctor's note does not state this clearly, your score will be zero.

6. Course Expectations

6.1) Clarifying Expectations

To succeed in this course, you'll need to invest a good amount of time and energy doing exercises outside the class time. If at any time you feel you're investing the required time and energy but aren't learning the material or improving your skills, contact me and I'll do my best to help you and to suggest additional resources and options. If you have questions or concerns that you believe can be handled via e-mail, feel free to contact me that way. If I cannot adequately respond to your question via e-mail, I'll ask you to come to my regular office hours or make an appointment.

6.2) Extra Credit

If you have more than 80% attendance, I will add 1 extra point (1%) to your final grade. If you have more than 90% attendance, I will add 2 extra points (2%) to your final grade.

6.3) Academic Integrity

Wayne State University aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Student Code of Conduct, please see https://doso.wayne.edu/conduct/codeofconduct.pdf. Students who commit or assist in committing dishonest acts are subject to sanctions described in the Student Code of Conduct.

6.4) Special Accommodations

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.