Syllabus: WQU 613 Econometrics

Course Length: 6 Weeks

Credit: 3 Credit Hours

Course Description

The Econometrics course covers econometrics as statistical methods as applied to finance, building on the concepts students were introduced to in Financial Markets I and II, Statistics and Python I and II courses. This course provides an introduction to the modelling and forecasting of financial markets, with a thorough grounding in basic regression and inference, and moving on to more advanced timeseries models like GARCH and cointegration.

Learning Objectives

Upon completion of the course, a student will be able to:

LO1. Describe the core functions of a bank and the regulatory environment within which financial institutions like banks operate
LO2. Understand Basic Econometrics and Finance Topics
LO3. Perform Single Equation Regression
LO4. Perform Assumptions of the Classical Model including Multicollinearity, Heteroscedasticity, Autocorrelation and Econometric Modeling
LO5. Examine and Implement Useful Tools in Econometrics
LO6. Perform Univariate Time Series and Application to Finance
LO7. Examine Conditional Heteroscedastic Models

Required Resources

Tsay, Ruey S. Analysis of Financial Time Series, Third Edition. John Wiley, 2010. ISBN: 978-1118305720

For more information on course materials and how to purchase them, please visit the "Course Materials" section of this course.

Course Schedule

Unit	Activities	Learning Objectives
Unit 1 (Week 1)	**Textbook Reading:** • Chapter 1 Section 1.1 – 1.3 **Lectures, Notes, and Quizzes:** • Introduction and Basics • Descriptive Stats • Econometric Models • Applied Hypothesis Testing **Project:** (Due by Monday of Week 3 at 23:30 UTC) • Implementing Descriptive Statistics In Python and Excel - 67 points **Discussion:** • CAPM and APT	LO1, LO2

Unit	Activities	Learning Objectives
Unit 2 (Week 2)	**Textbook Reading:** • Chapter 2 Section 2.1 – 2.11 • Chapter 12 Section 12.5 – 12.6 **Lectures, Notes, and Quizzes:** • Introduction to Regression • Stationarity and ADF Unit Root Test • Residuals and Autocorrelation • Heteroscedasticity and Multicollinearity • Structural Breaks and Outliers **Project:** (Due by Monday of Week 3 at 23:30 UTC) • Implement CAPM Model in Python and Excel – 67 points **Discussion:** • Is U.S. Economy Growing at its Potential? **Exam 1:** (Due by Tuesday of Week 3 at 23:30 UTC) • Exam 1: Units 1 and 2 - 100 points	LO3, LO4, LO7

Unit	Activities	Learning Objectives
Unit 3 (Week 3)	**Textbook Reading:** • Chapter 8 Section 8.1 – 8.8 **Lectures, Notes, and Quizzes:** • Time Series, AR and MA Processes • ARMA, Box-Jenkins and Wold's Decomposition • VAR Models, IRF and Monetary Policy • VEC Models **Project:** (Due by Monday of Week 4 at 23:30 UTC) • Forecasting U.S. House Prices - 67 points **Project:** (Due on Monday of Week 4 at 23:30 UTC) • Banco Central Do Brasil Monetary Policy in a VAR Model – 67 points **Discussion:** • Forecasting Commodity Prices	LO5

Unit	Activities	Learning Objectives
Unit 4 (Week 4)	**Textbook Reading:** • Chapter 3 Section 3.1 – 3.19, 3.16 • Chapter 7 Section 7.1 – 7.3 **Lectures, Notes, and Quizzes:** • ARCH and GARCH Models • Types of ARCH / GARCH Models • Value-at-Risk **Project:** (Due by Monday of Week 5 23:30 UTC) • Quantifying the Maximum Expected Loss – 67 points **Discussion:** • Modeling Nikkei 225 Daily Returns	LO6

Unit	Activities	Learning Objectives
Unit 5 (Week 5)	**Textbook Reading:** • No specific readings for Unit 5 **Lectures, Notes, and Quizzes:** • The Linear Probability Model • The Logit and Probit Models • The Probit Model • Censored Data Models • Principal Components Analysis • Regression **Project:** (Due by Monday of Week 6 23:30 UTC) • Equilibrium Foreign Exchange in Python – 67 points **Discussion:** • Short-Rate Modeling **Exam 2:** (Due by Tuesday of Week 6 23:30 UTC) • Exam 2: Units 3, 4, and 5 – 100 points	LO6
Unit 6 (Week 6)	**Textbook Reading:** • No specific reading for Unit 6 **Lectures, Notes, and Quizzes:** • Types of Regressions • Estimation with Maximum Likelihood • Modeling Security Returns and Estimating Spread • HJM Model and FX Markets **Discussion** • Bayesian VAR **Final Project** – 400 points (Due by the last day of the course 23:30 UTC)*	ALL learning objectives

**Note: The LMS will allow a two-day grace period for submissions of the Final Exam and Final Project to ensure you have the time to properly make the submissions. The LMS will remain open, to allow these submissions, until the Tuesday (at 23:30 UTC) after the course end date.*

All quizzes and tests must be completed and assignments, including projects, must be submitted by the due date and time listed in the schedule above.

UTC (Coordinated Universal Time) is a worldwide time standard that WQU uses to accommodate students worldwide. To find the current time in UTC and convert it to your local time, you can visit the World Time Server website.

It is your responsibility as a student to determine your local time equivalent to UTC in order to meet your deadlines and be successful in this course.

Course Time Commitment

This is a 3 semester credit hour course, which equates to approximately 135 hours of work. You are expected to spend an average of 20-25 hours per week on coursework.

A typical weekly breakdown of student time is as follows:

- Course discussions: 2-3 hours/week
- Assigned readings: 3-4 hours/week
- Lecture, lecture notes, and other weekly course materials: 6-7 hours/week
- Assessments (quizzes and exams): 4-5 hours/week
- Studying and preparation: 5-6 hours/week

Helpful Information

At the beginning of each course, your professor will email a welcome letter that includes important information to help you achieve success in your studies. Your professor will be actively involved in the course through the grading of course materials, the facilitation of discussion boards, and answering questions on the

discussion board or by e-mail. Professors will typically respond to questions within 48 hours.

For detailed information about getting help, review the "I Need Help" pages in the "Course Materials" section of this course.

Course Materials

There are required course materials that must be obtained to be successful in this course. You can purchase or rent these materials through an online vendor of your choice, a local seller, a library, or through the WQU Bookstore.

For detailed information about the textbook and case studies for this course, review the "Purchase Textbooks & Materials" pages in the "Course Materials" section of this course.

Course Discussion

To participate in the course discussion, you must first create a Piazza account. Instructions for creating an account are found in the "Signup for Discussion Board" page in the "Course Materials" section.

ProQuest Library

The ProQuest Library is a free resource available to you as a WQU student. It provides additional sources for discussions, assignments, and projects. More information, as well as a link to access the library, can be found in the "Access ProQuest Library" page in the "Course Materials" section.

Graded Activities

Exams and quizzes are taken and submitted within the course itself. Detailed exam instructions can be found in the "Introduction to Exam" section found prior to each exam.

Assignments and projects are to be completed according to the instructions provided within the course. Your completed assignment or project must be submitted using the "Select a File" button at the bottom of the assignment or project page. Assignments and projects e-mailed to professors or to Student Support WILL NOT be accepted.

Grade Breakdown

Your final grade in this course is based on the following:

Activity	Number of Items	Course Weighting
Projects	6	400 points (40%)
Exam	2	200 points (20%)
Final Project	1	400 points (40%)
	Total Points:	1000 Points

Grading Policy

Letter grades are awarded base on the total points you earn on the graded activities:

Score	Total Points	Letter Grade	GPA Points
90-100 %	900-1000	A	4.0
80-89 %	800-899	B	3.0
70-79 %	700-799	C	2.0
60-69 %	600-699	D	1.0
0-59 %	599 or fewer	F	0.0

Performance-Based Grading

The professor reserves the right to modify final grades based on student performance on course assignments as appropriate, especially as it relates to student participation in the Piazza discussion board. Individual student's grades will not be lowered if the professor modifies the final course grades.

Course Deadlines & Late Work

This is a 6-week, online course. It is highly recommended that you follow the schedule in the syllabus to ensure on time completion of all required activities. You are expected to become familiar with these dates and adhere to them as there are no extensions available for coursework. Any assignment not completed and submitted by the due date will receive a grade of zero.

Late assignments or projects WILL NOT be accepted. Exam deadlines WILL NOT be extended.

Feedback

Professors provide grades and feedback on assignments. Once posted by the professor, grades and feedback are found on the assignment or project page.

This course remains open for one week after the end date to give you the opportunity to review your grades and feedback.

Course Evaluation

The Course Survey becomes available within the last two weeks of this session and will remain open for one week after the end date to ensure you have ample opportunity to complete the survey.

The Course Survey gives you the opportunity to evaluate your course, the professor, and provide critical feedback to help WQU continue to improve the quality of the curriculum and the student experience.

Academic Integrity

All work submitted in this course must be your own original work. Submitting another student's work as your own, or presenting information or opinions without properly citing the source of the work, is considered plagiarism.

Similarly, while you may choose to participate in a study groups, you, and other students, may not share quizzes, exams, or assignments with each other nor post any course content on information sharing sites.

Students who fail to adhere to these guidelines are subject to disciplinary action as indicated in the "Academic Integrity" section of the WorldQuant University Student Catalog.

WQU Code of Conduct

You are expected to adhere to all elements of the WQU Code of Conduct as presented in the Student Catalog. Students found to be in violation of the Code of Conduct are subject to disciplinary action, including probation, suspension, and/or expulsion.

(Revision Date: February 28, 2018)