



# ECON232

## Econometric Principles

S2 Day 2019

*Dept of Economics*

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

### Unit convenor and teaching staff

Unit Convenor

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Credit points

3

Prerequisites

ECON241 or STAT272

Corequisites

Co-badged status

Unit description

This unit provides an introduction to modern econometric techniques. Its principal objectives are to introduce students to the multiple regression model and to develop literacy in methods that are commonly used to analyse data in economics, finance and business. The topics covered usually include multiple regression analysis, use of indicator variables, binary-response models, regression analysis with time series, stationary and non-stationary time series, cointegration, and error-correction models. This unit will be of value to any students who are interested in how useful information may be inferred from economic data in a logically valid way.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

Describe and apply the econometric concepts relevant for each topic covered in the unit.  
 Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.

Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.

Evaluate the appropriateness of alternative econometric techniques in practical applications.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Tutorial Exercises</u></a>	10%	No	Weeks 2-13 in class
<a href="#"><u>Quiz</u></a>	15%	No	Tuesday in Week 8 at 7am
<a href="#"><u>Assignment</u></a>	15%	No	7am on Monday in Week 12
<a href="#"><u>Final Examination</u></a>	60%	No	University Examination Period

### Tutorial Exercises

Due: **Weeks 2-13 in class**

Weighting: **10%**

#### Submission

The tutorial exercises must be attempted and submitted during the tutorial class in which the student is officially enrolled each week. The exercises will not be made available for assessment at any other time. Each tutorial assesses work that has been covered in previous lectures, with an emphasis on the most recent topics covered. Students are permitted to re-attempt questions that they have incorrectly answered any number of times during the class, but a penalty of 20% will apply to each question, each time that each question is re-attempted (i.e. the maximum available marks from each question decays linearly as the number of attempts increases). The best 10 out of 12 tutorial results will contribute a total of 10% to the final grade.

What is required to complete the unit satisfactorily?

Students must demonstrate satisfaction of the learning objectives assessed in each particular tutorial exercise. Students are welcome to consult reference material during the tutorial and may discuss the work with other students and the tutor. However, the responses that students submit must reflect their own ideas and work. In particular, students who submit the answers of other students, without making any contribution to the derivation of the answers, will be deemed to have violated the Academic Honesty Policy. Students must bring their Macquarie University Campus Card to each tutorial and present it when requested. Failure to present a campus card when requested may result in a student being refused access to the tutorial.

## Extensions

No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of zero for the task, except for cases in which the student is granted Special Consideration by the University. In such cases, if the relevant disruption results in the student submitting fewer than 10 tutorial exercises, for the affected tutorial the student will be awarded a mark equivalent to the arithmetic mean of the marks awarded for the tutorials that were submitted on time.

On successful completion you will be able to:

- Describe and apply the econometric concepts relevant for each topic covered in the unit.
- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## Quiz

Due: **Tuesday in Week 8 at 7am**

Weighting: **15%**

The quiz assesses the work covered in lectures up to the submission deadline and contributes 15% to the final assessment. It will consist of a set of questions to be answered on iLearn.

### Submission

The quiz will be made available on iLearn once sufficient material has been covered in lectures to enable students to attempt it. The only acceptable form of submission will be via the relevant links in iLearn. The quiz may be submitted once only.

What is required to complete the unit satisfactorily?

Students must demonstrate satisfaction of the learning objectives assessed in each particular assignment. Students will be awarded a numerical mark based on the marking scheme contained in the quiz.

It is intended that students will work on the quiz independently. Students who collude or otherwise violate the Academic Honesty Policy will face further action which may result in failure in the unit and more severe penalties.

### Extensions

No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for Special Consideration is made and approved. At the deadline, iLearn will automatically submit the quizzes of any students who have not yet submitted their answers.

On successful completion you will be able to:

- Describe and apply the econometric concepts relevant for each topic covered in the unit.
- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## Assignment

Due: **7am on Monday in Week 12**

Weighting: **15%**

The assignment assesses work covered in lectures up to the submission deadline and contributes 15% to the final assessment. Students will be given an applied econometric problem to work on and will be required to submit a written report on their investigation of the problem. Students will also be required to submit relevant computer files.

### Submission

The assignment will be made available on iLearn once sufficient material has been covered in lectures to enable students to attempt it. The only acceptable form of submission will be via the relevant links in iLearn. Note in particular that assignments that are emailed to staff will not be accepted. The assignment may be submitted once only.

What is required to complete the unit satisfactorily?

Students must demonstrate satisfaction of the learning objectives assessed in each particular assignment. Students will be awarded a numerical mark. Detailed information about the requirements of the assignment will be released with the assignment question.

It is intended that students will work on the assignments independently. Students who collude or otherwise violate the Academic Honesty Policy will face further action which may result in failure in the unit and more severe penalties.

### Extensions

No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply to cases in which an application for [Special Consideration](#) is made and approved. Students who wish to submit the assignment after the deadline should notify the unit convenor by email so that the necessary arrangements may be made.

On successful completion you will be able to:

- Describe and apply the econometric concepts relevant for each topic covered in the unit.
- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## Final Examination

Due: **University Examination Period**

Weighting: **60%**

The final examination is of 2 hours duration and will be held in the official Macquarie University examination period. All students must attend the examination at the time and place designated in the University Examination Timetable. The examination will include short answer questions that require both calculation and written responses. Details of the structure of the final examination will be provided when available during the semester.

Students who do not attend the final examination will be awarded a grade of FA (Failed Absent). The only exceptions to this are cases in which the University grants the student Special Consideration. In such cases, the affected student will be required to sit a supplementary examination at the place and time nominated by the University.

On successful completion you will be able to:

- Describe and apply the econometric concepts relevant for each topic covered in the unit.
- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## Delivery and Resources

### Classes

Lecture Class: Tuesday 4 - 6 pm (T1 Theatre, 17 Wallys Walk)

There is a single 2 hour lecture class per week and there is also a 1 hour tutorial class. Students must enrol in a tutorial class that they are able to attend each week. Changes of tutorial class may only be effected using the online enrolment system and may only be made during the first two weeks of semester.

The timetable for classes can be found on the University website at: [timetables.mq.edu.au](http://timetables.mq.edu.au)

### Required and Recommended Texts and/or Materials

Woodridge, Jeffrey M., *Introductory Econometrics: A Modern Approach*, 7<sup>th</sup> edition, or

Hill, R. Carter, William E. Griffiths, and Guay C. Lim, *Principles of Econometrics*, 5<sup>th</sup> edition

Material such as lecture slides, examples, etc will be made available on the unit web site as the unit progresses.

## Technologies used and required

(1) Students will require a **non-programmable calculator** for tutorials, tests and the final examination.

Students will also require access to a **computer**, on which the following are installed or accessible.

(2) **Gretl**: It is free, open-source software. Visit the *Gretl* website: <http://gretl.sourceforge.net/>, and choose the operating system of your computer from the menu on the left-hand side. Download and install the program onto the computer. Download also the manual and all the data for practice.

(3) An internet browser, such as **Firefox** and **Internet Explorer**, to access *iLearn*.

(4) **Adobe Acrobat Reader**: to read course material downloaded from *iLearn*. This program can be downloaded from <http://www.adobe.com/downloads/>.

### Learning and Teaching Activities

ECON232 is taught via lectures, set reading, and tutorial exercises. Students are expected to attend lectures, read the texts after the lecture, attend tutorial classes, submit tutorial exercises and assignments, and participate in class discussions. It is expected that students will spend an average of 10 hours per week working on this unit.

### Unit Webpage

Useful information and some course material will be made available on the learning management system (*iLearn*): [ilearn.mq.edu.au](http://ilearn.mq.edu.au). Visit the homepage regularly for new information, course material and announcements.

## Unit Schedule

### Topics

#### 1. MULTIPLE REGRESSION ANALYSIS: ESTIMATION & INTERPRETATION

- Simple regression versus multiple regression
- Standard assumptions
- OLS Estimation
- Properties of the OLS Estimator

- Functional forms and interpretation
- Effects of data scaling on OLS statistics
- Goodness of fit

## **2. MULTIPLE REGRESSION ANALYSIS: INFERENCE**

- Normality assumption and central limit theorem
- Testing a single equation hypothesis
- One-sided and two-sided alternatives
- Critical value method and p-value method
- Types of errors in hypothesis testing
- Confidence intervals and hypothesis testing
- Testing multiple linear restrictions (F test)

## **3. MULTIPLE REGRESSION ANALYSIS WITH QUALITATIVE INFORMATION**

- Intercept dummy and slope dummies
- Dummy variable trap
- Log dependent variable and dummy explanatory variables
- Interactions among dummy variables
- Testing for differences in regression functions across groups

## **4. BINARY-RESPONSE MODELS**

- Opinion polls
- Linear probability model
- Probit model
- Logit model
- Maximum-likelihood (ML) principle and properties of MLE

## **5. ENDOGENOUS EXPLANATORY VARIABLES and IV ESTIMATION**

- Exogenous and endogenous explanatory variables
- Inconsistency of OLS estimator
- Moments and consistent estimation
- Simple instrumental variable (IV) estimator
- Two-stage least squares (2SLS) estimator
- Testing for endogeneity
- Testing for the validity of IVs

## **6. REGRESSION ANALYSIS WITH TIME SERIES DATA**

- Stochastic processes



- Stationary stochastic processes
- Lag operator and differencing
- Static models
- Finite distributed lag (FDL) models
- Autoregressive (AR) processes
- Autocorrelation function (ACF) and partial autocorrelation function (PACF)
- Serially correlated errors in the regression model
- Trend and seasonality

## 7. NON-STATIONARY PROCESSES AND UNIT ROOT TEST

- Trend-stationary and difference-stationary processes
- Integrated processes and unit roots
- Testing for unit roots
- Spurious regression
- Cointegration and error-correction models

## 8. MODELS FOR PANEL DATA (W13)\*

- Heterogeneity
- Fixed-effects model
- Random-effects model

\* This topic will be covered only if time permits.

## Unit Schedule

**AN APPROXIMATE SCHEDULE OF WORK (The schedule of lecture topics may be varied during the semester according to the rate of progress made. The deadlines for the assignments, and the tutorial schedule, may also be altered.)**

Week	Topic	Tutorials	Assignments Due
1	Unit Guide, Multiple Regression Analysis		
2	Multiple Regression Analysis: Estimation & Interpretation	Tutorial 1	
3	Multiple Regression Analysis: Inference	Tutorial 2	
4	Multiple Regression Analysis: Qualitative Information	Tutorial 3	
5	Opinion Polls	Tutorial 4	

6	Binary-Response Models	Tutorial 5	
7	Endogenous Explanatory Variables & IV Estimation	Tutorial 6	
	Mid-semester break		
8	Endogenous Explanatory Variables and IV Estimation	Tutorial 7	Quiz
9	Regression Analysis with Time Series Data	Tutorial 8	
10	Serial Correlation	Tutorial 9	
11	Non-stationarity, Unit Root, and Cointegration	Tutorial 10	
12	Models for Panel Data	Tutorial 11	Assignment
13	Exam Briefing	Tutorial 12	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway \(https://students.mq.edu.au/support/study/student-policy-gateway\)](https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Honesty

The nature of scholarly endeavour, dependent as it is on the work of others, binds all members of the University community to abide by the principles of academic honesty. Its fundamental principle is that all staff and students act with integrity in the creation, development, application and use of ideas and information. This means that:

- all academic work claimed as original is the work of the author making the claim
- all academic collaborations are acknowledged
- academic work is not falsified in any way
- when the ideas of others are used, these ideas are acknowledged appropriately.

Further information on the academic honesty can be found in the Macquarie University Academic Honesty Policy at [http://www.mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/docs/academic_honesty/policy.html). Students are required to comply with this policy and heavy penalties may apply in cases where the policy is breached. Several methods are used to monitor compliance with this policy.

## Grades

Macquarie University uses the following grades in coursework units of study:

- HD - High Distinction
- D - Distinction
- CR - Credit
- P - Pass
- F - Fail Grade

Descriptors and other information concerning grading are contained in the Macquarie University Grading Policy which is available at: <http://www.mq.edu.au/policy/docs/grading/policy.html>

## Grading Appeals

During the semester, if you wish to query a mark awarded to you for a particular assessment task then you should email the Unit Convenor within 1 week of the marked task being returned to you. Your email should clearly state the nature of your query and any grounds you have for

suspecting that an error has been made in the calculation of your mark. If, at the conclusion of the unit, you have performed below expectations, and are considering lodging an appeal of grade, please refer to the following website which provides information about these processes and the cut off dates in the first instance. Please read the instructions provided concerning what constitutes a valid grounds for appeal before appealing your grade.

[http://www.businessandconomics.mq.edu.au/new\\_and\\_current\\_students/undergraduate\\_current\\_students/how\\_do\\_i/grade\\_appeals/](http://www.businessandconomics.mq.edu.au/new_and_current_students/undergraduate_current_students/how_do_i/grade_appeals/)

## Special Consideration Policy

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability. A Special Consideration policy exists to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level. The policy is available at: <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>. It is recommended that students read this policy before notifying the University of a disruption to their studies.

Students who are granted Special Consideration may be required to sit a written and/or oral examination in place of the affected assessment task.

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

### Learning outcomes

- Describe and apply the econometric concepts relevant for each topic covered in the unit.
- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

### Assessment tasks

- Tutorial Exercises
- Quiz
- Assignment
- Final Examination

### Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## **Learning outcomes**

- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## **Assessment tasks**

- Assignment
- Final Examination

## **Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## **Learning outcomes**

- Estimate econometric models and test parametric hypotheses using techniques that are appropriate for the problem at hand.
- Diagnose and resolve problems relating to the violation of standard assumptions in econometric models. Make conclusions and recommendations regarding your solutions.
- Evaluate the appropriateness of alternative econometric techniques in practical applications.

## **Assessment tasks**

- Tutorial Exercises
- Quiz
- Assignment
- Final Examination