Macroeconometrics: ECOM90007

by Tomasz Woźniak • Department of Economics • University of Melbourne

Semester 1, 2023

Outline.

Decision-making at central banks, economic governance institutions, and consulting firms relies on advanced empirical analyses of economic data. This subject facilitates working with a cutting-edge econometric methodology for empirical macroeconomic research. Topics covered include forecasting economic outcomes using large data sets, analysing the dynamic effects of structural shocks on the business cycle and the labour market, and forecasting CO2 emissions for the 21st century. They provide evidence-based background for shaping the economic policy of a country. Finally, the focus is on learning programming and project management skills that facilitate performing reproducible econometric analyses in **RStudio**, **R**, **Quarto**, **git**, and **GitHub**.

Contact Details.

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Group meetings.

In-person active learning sessions are scheduled on:

BVARs: Wednesdays 6 – 7:30 pm, FBE 304
SVARs: Thursdays 6:15 – 7:45 pm, FBE 304

Attendance is monitored

Consultations.

Mondays, 2:15 – 3:45 pm FBE 350

Subject Resources.

All subject resources will be made available on Canvas and include:

- Lecture slides
- R files for the reproduction of results from the lectures
- Online textbook by Tomasz
- Online repositories with lecture materials
- Template repository for the research project
- *Introduction to R* Canvas module and other resources for learning R

Introduction to R.

The objective of the complementary four sessions is to facilitate the beginning of working and computer programming with R.

The sessions are available online via a separate Canvas module that is not graded.

Session 1: Introduction to R

Session 2: Basic programming in R

Session 3: Numerical integration

Session 4: Numerical optimisation

Session 5: Quarto documents

Session 6: Project development with git and GitHub

Session 7: Working with template repository on GitHub

Syllabus.

		Concepts and Tools
1	1	What's macroeconometrics?
	2	Maximum likelihood estimation
2	3	Bayesian estimation
	4	Numerical optimization and integration
3	5	Understanding unit-rooters
		Macroeconomic Forecasting with Fat Data
	6	Vector Autoregressions
4	7	Bayesian VARs
	8	Forecasting with Bayesian VARs
		Test 1
5	9	Forecasting with Large Bayesian VARs
		Modeling Effects of Monetary Policy
	10	Structural Vector Autoregressions
6	11	Structural VAR tools
	12	Bayesian estimation of Structural VARs
		Test 2
7	13	Modeling effects of monetary policy
		Modeling Trend Inflation
	14	Unobserved Component models
8	15	Bayesian estimation using precision sampler
	16	Modeling trend inflation
		Modeling Conditional Heteroskedasticity
9	17	Stochastic Volatility models
	18	Bayesian estimation using auxiliary mixtures
		Topics in Climate Change
10	19	Forecasting CO_2 Emissions for the 21st Century
	20	Forecasting CO_2 Emissions for the 21st Century
		Research Project Presentations
11	21	Presentations
	22	Presentations
		Lecturer's Research Presentation
12	23	`bsvars` package presentation
	24	Research presentation

Assessment.

The table presents an overview of the assessment.

RP stands for **R**esearch **P**roject

Week	Task	Grade
4	**Test 1:** Concepts and Tools	10%
5	**RP1:** question, data, model, hypothesis	10%
6	**Test 2:** Bayesian Estimation	10%
8	**RP2:** estimation procedure and algorithm	10%
10	**RP3:** empirical analysis	10%
4–10	Learning repository contribution	10%
11	**RP Presentation**	10%
12+	**RP Final report**	30%

Short Tests.

Two 30-minute long tests are taking place in weeks 4 and 6.

Each of them is worth 10% of the final grade.

Learning Repository Contribution.

A contribution to the learning repository on the *Bayesian estimation of autoregressions* is worth 10% of the final grade.

Research Project.

A semester-long individual research project is worth 70% of the final grade.

The development of the project throughout the semester includes small intermediate part submissions **PR1**–**PR3**. Each of these parts includes the submission of the proposal, providing feedback on peer submissions, and implementation of the received feedback from peers and lecturer.

The report includes the proposal of a model with original features, derivation and coding of the Bayesian estimation procedure, and empirical investigation answering the proposed question or hypothesis.

The report can be developed on one of three themes:

1. Forecasting with Bayesian VARs
2. Assessing policy effects with Structural VARs
3. Trend and cycle analysis with Unobserved Component models

The **Presentation** focuses on the preliminary empirical analyses.

the **RP** final submission is in the examination period.

Learning outcomes.

At the completion of the subject students will be able to:

LO1: Develop original econometric methodology for applied macroeconomic analyses

LO2: Propose econometric techniques and models to verify hypotheses that inform fiscal or monetary policy

LO3: Derive Bayesian estimation procedure for the newly proposed macroeconometric model

LO4: Write computer programs in R that implement the derived estimation procedure

LO5: Apply the computer program in the forecasting or structural analyses of Australian macroeconomic data

LO6: Transparently create econometric data analysis using the newly proposed methodology in a fully reproducible report developed collaboratively

Generic skills.

At the completion of the subject students will also be able to:

GS1: Obtain and format data from the original sources in an automated workflow

GS2: Document the essential data properties and incorporate them in the econometric modelling

GS3: Handle statistical distributions of parameters and forecasted values to make the econometric analysis feasible

GS4: Apply linear algebra operations and basic statistical theory to facilitate model estimation, hypothesis verification, and reliable forecasting

GS5: Create visualisations of data and estimation results that inform economic interpretations

GS6: Use functional programming to implement econometric procedures

GS7: Propose economic interpretations based on the empirical evidence

GS8: Obtaining, providing, and implementing constructive and actionable feedback

GS9: Managing a programming and data analysis project using git and GitHub

GS10: Communicating research outcomes in plain language and using visualisations

Academic Integrity.

Academic Honesty

The University maintains high academic standards in its courses and subjects and expects students to conduct themselves in a manner which is fair, honest and consistent with the principles of academic integrity, particularly when undertaking assessment and research. http://academicintegrity.unimelb.edu.au/

Referencing

Each source used for a written piece of assessment must be referenced. This is to acknowledge that your material is not based entirely on your own ideas, but is based, in part, on the ideas, information, and evidence of others. This is desirable as you are attending University in order to learn from others.

You will be required to use the APA system or Harvard System of referencing. The library has prepared a website to help students correctly reference: http://www.library.unimelb.edu.au/recite

It is important that all material you present for assessment is referenced correctly. Material that has not been referenced correctly may be considered to be plagiarised, and as such may be penalised. We will also look for evidence that material included in the bibliography has been used in the assignment.

The Academic Skills Unit has produced resources to assist students with referencing
https://services.unimelb.edu.au/academicskills/undergrads/top_resources

The Library also provides advice on referencing:
http://library.unimelb.edu.au/cite

University Services

Timetable

MyTimetable is a class timetabling system that creates individual timetables for students based on submitted class preferences, ensuring everyone has an equitable opportunity of getting their preferred class timetable. You will use this system to create your class timetable prior to each study period.

By following a preference-based model, students who have other commitments, such as employment or carer responsibilities, or who are returning or living overseas during the timetabling period, aren?t disadvantaged by their limited availability. When allocating class timetables, MyTimetable also takes into consideration factors such as class size limits and potential clashes to ensure all students are equally accommodated. Further information is available on the web at https://students.unimelb.edu.au/admin/class-timetable

Stop 1: Connecting Students and Services

Stop 1 is here to provide you with a range of support services throughout your university degree, from help with enrolment, administration and wellbeing to advice on building your skills and experiences. https://students.unimelb.edu.au/stop1

Academic Skills

Academic Skills offers a range of workshops and resources to help you with study skills including researching, writing and referencing, presentation skills and preparing for exams. Visit their website via http://services.unimelb.edu.au/academicskills

Service Finder

The University of Melbourne offers one of the most comprehensive student support networks in Australia. Use this site to locate a wide range of services http://services.unimelb.edu.au/finder

Student Counselling

Students attend counselling to talk about personal, emotional, or mental health issues which might be affecting their study and life. The University's Counselling and Psychological Services (CAPS) provides free, confidential, short-term professional counselling to currently enrolled students and staff. https://services.unimelb.edu.au/counsel/individual

Student Equity and Disability Support

Student Equity and Disability Support provides services for students who need ongoing support with their studies. They understand that adjustments to learning and assessment are sometimes required to allow all students to reach their full potential. Learn more about the services provided, how to find support and how to register for assistance. http://services.unimelb.edu.au/student-equity

University of Melbourne Library Services

As well as holding an extensive collection of books, ebooks, digital media and periodicals, library staff provide research guidance and support for students. http://library.unimelb.edu.au/

These Business and Economics Library Guides have been designed specifically for Faculty of Business and Economics staff and students. http://unimelb.libguides.com/sb.php?subject_id=80310

Policy.

Alternative Exam Arrangements (AEA)

The definition of and eligibility requirements for alternative exam arrangements (AEA) can be found via http://students.unimelb.edu.au/admin/

Assessment and Results Policy

The University?s assessment policy provides a framework for the design, delivery and implementation of assessment of students in award and non-award courses and subjects. Assessment is designed to contribute to high quality learning by students, and to allow for quality assurance and the maintenance of high academic standards. https://policy.unimelb.edu.au/MPF1326

Assignment Extension

Requests for an assignment extension should be submitted here: http://go.unimelb.edu.au/yh9n

Before completing this form, please read the Assignment Extension Policy, which can be found at:
http://policy.unimelb.edu.au/MPF1326#section-4.37

Exam Policy

The University requires that you are available for the entire examination period. Please see the University's Principal Dates via https://www.unimelb.edu.au/dates#2021 for the full annual calendar. Supplementary exams will not be provided in cases of absence during the examination period unless the absence is due to serious illness or other serious circumstances and a Special Consideration application is submitted and approved.

Information on Calculators in Examinations

Effective from 1 January 2017, the approved calculator for all subjects is the Casio FX82 (any suffix). No equivalent models of calculators will be permitted in exams. You are required to purchase your own calculator and are responsible for ensuring your calculator is in good working order with fresh batteries.

Plagiarism and Collusion

Plagiarism (failure to cite your sources correctly and completely) and collusion (unauthorised collaboration with another person to prepare an assessment task) are considered academic misconduct and attract severe penalties. More information is available on the University's Academic Integrity website via http://go.unimelb.edu.au/rha6

Special Consideration

As a student, you may experience extraordinary or unusual circumstances, or ongoing circumstances that adversely affect your academic performance. The University has policies in place to support students who are experiencing academic disadvantage. For more information, visit http://students.unimelb.edu.au/admin/special