

# Macroeconomics II

## University of Padova

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### Aim of the course

This is a 30 hour-subject. The goal of this subject is to learn how to estimate multivariate models for the analysis of the business cycle, identify its drivers, estimate the transmission mechanisms of structural impulses, and assess their relevance. The main tools studied in this course are the Vector AutoRegressive (VAR) model, which has been heavily employed to conduct macroeconomic analysis since (at least) the seminal contribution by Sims (1980), the local projections analysis originally proposed by Jordà (2005), and the DSGE frameworks popularized by Christiano, Eichenbaum, and Evans (2005) and Smets and Wouters (2007). Students will be introduced to a variety of different identification strategies to process the data and identify the business cycle effects of the most relevant macroeconomic shocks, as well as to techniques that enable a researcher to take a dynamic stochastic general equilibrium (DSGE) framework to the data. At the end of the course, students will be able to: i) read state-of-the-art scientific papers based on Structural VARs (SVARs), Local Projections (LPs), and DSGE frameworks; ii) produce scientific research with such approaches.

### Assessment

- *Students' presentations of state-of-the-art papers: 20%*. These 45 minute-long presentations will be group-presentations, with questions from the audience (Efrem, Giovanni, and the non-presenting students). The papers you will be required to read and present will be communicated in class.
- *Final project: 80%*. The final project is expected to be a novel piece of research with a short motivation, a description of the data and the econometric approach, a documentation of the main result with comments (one Figure/Table could be enough), and a short concluding section. In other words, this project is expected to be a short scientific-type of paper. The final project is expected to be a solo

project (although collaboration among students is allowed). The (hard!) deadline for the project is March 30, 2025.

## Classes

In presence. Please have a look at the official schedule for the time/place of our classes (the latter applies if classes are in presence - otherwise, a zoom link will be sent to you for each class we do online). Students' presentations will take place at the end of the course.

## Syllabus & readings

References for this subject are books and scientific papers. The two main books are Kilian and Lütkepohl (2017) (VAR models) and Herbst and Schorfheide (2015) (DSGE frameworks).<sup>1</sup> The papers listed below are interesting readings (in part covered in class) one could start from to write his/her PhD thesis.

### 1. *From DSGE to VAR frameworks*

Kilian and Lütkepohl (2017) - chapter 6, Fernández-Villaverde, Rubio-Ramírez, Sargent, and Watson (2007), Ravenna (2007), Del Negro, Schorfheide, Smets, and Wouters (2007), Forni, Gambetti, and Sala (2019).

### 2. *SVAR: Zero restrictions*

Kilian and Lütkepohl (2017) - chapters 4 & 8, Sims (1980), Christiano, Eichenbaum, and Evans (1999), Christiano, Eichenbaum, and Evans (2005), Stock and Watson (2001), Castelnuovo and Surico (2010), Wu and Xia (2016).

### 3. *DSGE models: Limited-information estimation by SVAR IRFs matching*

Boivin and Giannoni (2006), Christiano, Eichenbaum, and Evans (2005), Canova and Sala (2009), Christiano, Trabandt, and Walentin (2010).

### 4. *SVAR & DSGE models: Uncertainty shocks and non-linearity in macro (an introduction)*

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<sup>1</sup>The Kilian and Lütkepohl (2017) is available at <https://doi.org/10.1017/9781108164818>.

*Theory*: Fernández-Villaverde, Guerrón-Quintana, Rubio-Ramírez, and Uribe (2011), Basu and Bundick (2017)

*Empirics*: Bloom (2009), Jurado, Ludvigson, and Ng (2015), Caggiano, Castelnovo, and Groshenny (2014), Caggiano, Castelnovo, and Pellegrino (2017), Ludvigson, Ma, and Ng (2021), Pellegrino, Castelnovo, and Caggiano (2023).

#### 5. *SVAR: Traditional sign restrictions & recent refinements*

Kilian and Lütkepohl (2017) - chapter 13, Faust (1998), Canova and de Nicoló (2002), Uhlig (2005), Fry and Pagan (2011), Rubio-Ramírez, Waggoner, and Zha (2010), Canova and Paustian (2011), Baumeister and Hamilton (2015), Kim, Moon, and Velasco (2017), Uhlig (2017), Arias, Rubio-Ramírez, and Waggoner (2018), Antolín-Díaz and Rubio-Ramírez (2018), Arias, Caldara, and Rubio-Ramírez (2019), Kilian and Murphy (2012).

#### 6. *Proxy-SVARs*

Kilian and Lütkepohl (2017) - chapter 15, Mertens and Ravn (2013), Stock and Watson (2018), Gertler and Karadi (2015), Caldara and Kamps (2017), Jarociński and Karadi (2020), Wolf (2020), Känzig (2021), Lagerborg, Pappa, and Ravn (2022).

#### 7. *Counterfactual simulations with VARs*

Sims and Zha (2006), McKay and Wolf (2023).

#### 8. *Forecasting with VARs*

Giannone, Lenza, and Primiceri (2015), Giannone, Lenza, and Primiceri (2019).

#### 9. *Local Projections*

Kilian and Lütkepohl (2017) - chapter 12, Jordà (2005), Ramey and Zubairy (2018), Tenreyro and Thwaites (2016), Plagborg-Møller and Wolf (2020), Ascari and Haber (2021), Jordà and Taylor (2023).

#### 10. *DSGE models: Metropolis-Hastings (time permitting)*

Herbst and Schorfheide (2015), chapters 2-4, Smets and Wouters (2007), Christiano, Motto, and Rostagno (2014), Canova and Sala (2009), Leeper, Traum, and Walker (2017), Angeletos, Collard, and Dellas (2020).

## References

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Denominazione	Macroeconomia II
Docente	Efrem Castelnuovo e Giovanni Pellegrino
Ore	30
CFU	6
Periodo di svolgimento	Gennaio-Febbraio 2025
Modalità di erogazione	<input checked="" type="checkbox"/> In presenza <input type="checkbox"/> A distanza <input type="checkbox"/> Duale
Lingua di erogazione	Inglese
Obbligo presenza	<input type="checkbox"/> Sì (% minima di presenza) <input checked="" type="checkbox"/> No
Contenuti del corso	<p>Gli strumenti principali studiati in questo corso sono il modello <i>Vector AutoRegressive</i> (VAR), ampiamente utilizzato per condurre analisi macroeconomiche sin dal contributo fondamentale di Sims (1980), l'analisi delle <i>Local Projections</i> proposta originariamente da Jordà (2005), e i modelli DSGE resi popolari da Christiano, Eichenbaum ed Evans (2005) e Smets e Wouters (2007). Gli studenti verranno introdotti a una varietà di strategie di identificazione per elaborare i dati e identificare gli effetti del ciclo economico derivanti dai più rilevanti shock macroeconomici, nonché a tecniche che permettono a un ricercatore di applicare un modello DSGE ai dati. Al termine del corso, gli studenti saranno in grado di: i) leggere articoli scientifici all'avanguardia basati su VAR strutturali (SVAR), <i>Local Projections</i> (LP) e modelli DSGE; ii) produrre ricerche scientifiche utilizzando questi approcci.</p> <ol style="list-style-type: none"><li>1. Dai modelli DSGE ai modelli VAR</li><li>2. SVAR: Restrizioni con zeri.</li><li>3. Modelli DSGE: Stima a informazione limitata mediante il matching dei risultati da modelli SVAR</li><li>4. Modelli SVAR e DSGE: Shock di incertezza e non linearità in macroeconomia (un'introduzione)</li><li>5. SVAR: Restrizioni tradizionali sui segni e recenti affinamenti</li><li>6. Proxy-SVAR</li><li>7. Simulazioni controfattuali con VAR</li><li>8. Previsioni con VAR</li><li>9. <i>Local Projections</i></li><li>10. Modelli DSGE: <i>Metropolis-Hastings</i> (tempo permettendo)</li></ol>
Obiettivi di apprendimento	L'obiettivo di questo corso è imparare a stimare modelli autoregressivi multivariati (VAR) per l'analisi del ciclo economico, identificare i fattori determinanti del ciclo economico, stimare i meccanismi di trasmissione degli impulsi strutturali e valutarne la rilevanza.
Metodologie didattiche	Lezioni frontali del docente e presentazioni di gruppo degli studenti





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Corso su competenze trasversali, interdisciplinari, transdisciplinari  Sì  No

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Possibile partecipazione di dottorandi di altri corsi  Sì  No

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Prerequisiti (non obbligatorio) max 3750 caratteri

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Modalità d'esame (se previsto) Valutazione finale:

- Presentazioni degli studenti di articoli all'avanguardia: 20% del voto finale. Queste presentazioni della durata di 45 minuti saranno presentazioni di gruppo, con domande dal pubblico (Efrem, Giovanni e gli studenti non relatori). Gli articoli che dovrete leggere e presentare saranno comunicati in aula.
- Progetto finale: 80% del voto finale. Il progetto finale deve essere un pezzo originale di ricerca con una breve motivazione, una descrizione dei dati e dell'approccio econometrico, una documentazione del risultato principale con commenti (una figura/tavola potrebbe essere sufficiente) e una breve sezione conclusiva. In altre parole, ci si aspetta che questo progetto sia un breve articolo di tipo scientifico. Il progetto finale deve essere un progetto individuale (anche se è consentita la collaborazione tra studenti). La scadenza (ferma!) per il progetto è il 30 marzo 2025.

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Materiale studio

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Informazioni  
aggiuntive

max 3750 caratteri

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Course unit English denomination	Macroeconomics II
Teacher in charge	Efrem Castelnovo and Giovanni Pellegrino
Teaching Hours	30
Number of ECTS credits allocated	6
Course period	January-February 2025
Course delivery method	<input checked="" type="checkbox"/> In presence <input type="checkbox"/> Remotely <input type="checkbox"/> Blended
Language of instruction	English
Mandatory attendance	<input type="checkbox"/> Yes (% minimum of presence) <input checked="" type="checkbox"/> No
Course unit contents	<p>The main tools studied in this course are the Vector AutoRegressive (VAR) model, which has been heavily employed to conduct macroeconomic analysis since (at least) the seminal contribution by Sims (1980), the local projections analysis originally proposed by Jordà (2005), and the DSGE frameworks popularized by Christiano, Eichenbaum, and Evans (2005) and Smets and Wouters (2007). Students will be introduced to a variety of different identification strategies to process the data and identify the business cycle effects of the most relevant macroeconomic shocks, as well as to techniques that enable a researcher to take a dynamic stochastic general equilibrium (DSGE) framework to the data. At the end of the course, students will be able to: i) read state-of-the-art scientific papers based on Structural VARs (SVARs), Local Projections (LPs), and DSGE frameworks; ii) produce scientific research with such approaches.</p> <ol style="list-style-type: none"><li>1. From DSGE to VAR frameworks</li><li>2. SVAR: Zero restrictions</li><li>3. DSGE models: Limited-information estimation by SVAR IRFs matching</li><li>4. SVAR &amp; DSGE models: Uncertainty shocks and non-linearity in macro (an introduction)</li><li>5. SVAR: Traditional sign restrictions &amp; recent refinements</li><li>6. Proxy-SVARs</li><li>7. Counterfactual simulations with VARs</li><li>8. Forecasting with VARs</li><li>9. Local Projections</li><li>10. DSGE models: Metropolis-Hastings (time permitting)</li></ol>
Learning goals	The goal of this subject is to learn how to estimate multivariate models for the analysis of the business cycle, identify its drivers, estimate the transmission mechanisms of structural impulses, and assess their relevance.
Teaching methods	Frontal lectures and students' group presentations.

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Course on transversal,  
interdisciplinary,  
transdisciplinary skills  Yes  
 No

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Available for PhD  
students from other  
courses  Yes  
 No

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Prerequisites  
(not mandatory) max 3750 caratteri

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Examination methods (in applicable) Assessment:

- Students' presentations of state-of-the-art papers: 20%. These 45-minute-long presentations will be group presentations, with questions from the audience (Efrem, Giovanni, and the non-presenting students). The papers you will be required to read and present will be communicated in class.
- Final project: 80%. The final project is expected to be a novel piece of research with a short motivation, a description of the data and the econometric approach, a documentation of the main result with comments (one Figure/Table could be enough), and a short concluding section. In other words, this project is expected to be a short scientific-type of paper. The final project is expected to be a solo project (although collaboration among students is allowed). The (hard!) deadline for the project is March 30, 2025.

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Suggested readings

- Angeletos, G., F. Collard, and H. Dellas (2020): "Business Cycle Anatomy," *American Economic Review*, 110(10), 3030–3070.
- Antolín-Díaz, J., and J. F. Rubio-Ramírez (2018): "Narrative Sign Restrictions," *American Economic Review*, 108(10), 2802–2829.
- Arias, J. E., D. Caldara, and J. Rubio-Ramírez (2019): "The Systematic Component of Monetary Policy in SVARs: An Agnostic Identification Procedure," *Journal of Monetary Economics*, 101, 1–13.
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- Ascari, G., and T. Haber (2021): "Non-linearities, state-dependent prices and the transmission mechanism of monetary policy," *Economic Journal*, forthcoming.
- Basu, S., and B. Bundick (2017): "Uncertainty Shocks in a Model of Effective Demand," *Econometrica*, 85(3), 937–958.
- Baumeister, C., and J. D. Hamilton (2015): "Sign Restrictions, Structural Vector Autoregressions, and Useful Prior Information," *Econometrica*, 83(5), 1963–1999.
- Bloom, N. (2009): "The Impact of Uncertainty Shocks," *Econometrica*, 77(3), 623–685.
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- Caggiano, G., E. Castelnuovo, and G. Pellegrino (2017): "Estimating the Real Effects of Uncertainty Shocks at the Zero Lower Bound," *European Economic Review*, 100, 257–272.
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- Canova, F., and M. Paustian (2011): "Business cycle measurement with some theory," *Journal of Monetary Economics*, 58, 345–361.
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- Castelnuovo, E., and P. Surico (2010): "Monetary Policy Shifts, Inflation Expectations and the Price Puzzle," *Economic Journal*, 120(549), 1262–1283.
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  - Christiano, L., R. Motto, and M. Rostagno (2014): "Risk Shocks," *American Economic Review*, 104(1), 27–65.
  - Christiano, L., M. Trabandt, and K. Walentin (2010): "DSGE Models for Monetary Policy Analysis," in: B. M. Friedman and M. Woodford (Eds.): *Handbook of Monetary Economics*, Volume 3a, 285–367.
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  - Giannone, D., M. Lenza, and G. Primiceri (2015): "Prior Selection for Vector Autoregressions," *Review of Economics and Statistics*, 97(2), 412–435.
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  - Lagerborg, A., E. Pappa, and M. Ravn (2022): "Sentimental Business Cycles," *Sentimental Business Cycles*, forthcoming.
  - Leeper, E. M., N. Traum, and T. B. Walker (2017): "Clearing Up the Fiscal Multiplier Morass," *American Economic Review*, 107(8), 2409–2454.
  - Ludvigson, S. C., S. Ma, and S. Ng (2021): "Uncertainty and Business Cycles: Exogenous Impulse or Endogenous Response?," *American Economic Journal: Macroeconomics*, 13(4), 369–410.
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- McKay, A., and C. K. Wolf (2023): "What Can Time-Series Regressions Tell Us About Policy Counterfactuals?," *Econometrica*, 91(5), 1695–1725.
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Additional information

max 3750 caratteri

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