Macroeconomics II

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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 is the Vector AutoRegressive (VAR) model, which has been heavily employed to conduct macroeconomic analysis since (at least) the seminal contribution by Sims (1980). Students will be introduced to reduced-form VARs and a variety of different identification schemes to move from the description of the data (provided by the reduced-form analysis) to the interpretation of the data (via the analysis provided by structural VARs). If time allows, we will also study dynamic stochastic general equilibrium (DSGE) frameworks and learn how to take them to the data, validate them, and use them to perform policy analysis. At the end of the course, students will be able to: i) read state-of-the-art scientific papers based on Structural VAR (SVAR) and (if we cover them) DSGE analysis; ii) produce scientific research based on such approaches.

Assessment

- *Students' presentations of state-of-the-art papers: 20%.* These 45 minute-long presentations will be group-presentations (3 groups of 2 students each), with questions from the audience (myself and the non-presenting students). The papers you will be required to read and present are those identified with the symbol (*).

- *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 31, 2022.

Classes

In presence or online, depending on the sanitary conditions. 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).

Tentatively, students' presentations will (tentatively) take place on February 2 and 16.

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). The papers listed below are interesting readings (in part covered in class) one could start from to write his/her PhD thesis. References marked with an asterisk will be presented in class by students.

VAR

1. *VAR: Reduced-form analysis*

   Kilian and Lütkepohl (2017) - chapter 2.

2. *SVAR: Cholesky-identification strategy*

   Kilian and Lütkepohl (2017) - chapter 4, Sims (1980), Christiano, Eichenbaum, and Evans (1999), Christiano, Eichenbaum, and Evans (2005), Stock and Watson (2001), Castelnuovo and Surico (2010).

3. *SVAR: Traditional sign restrictions*

   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), Baumeister and Hamilton (2015), Kim, Moon, and Velasco (2017), Uhlig (2017), Arias, Rubio-Ramírez, and Waggoner (2018).

4. *SVAR: Restrictions on coefficients, shocks, ratios, and impulse responses.*

   Ludvigson, Ma, and Ng (2021), (*) Antolín-Díaz and Rubio-Ramírez (2018), Furlanetto, Ravazzolo, and Sarferaz (2019), Arias, Caldara, and Rubio-Ramírez (2019), Kilian and Murphy (2012).

5. *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).

6. *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), (*) Antolín-Díaz and Surico (2022).

DSGE

7. *Turning a DSGE model into a Bayesian model*

Herbst and Schorfheide (2015), chapter 2.

8. *A crash course in Bayesian Inference*

Herbst and Schorfheide (2015), chapter 3.

9. *Metropolis-Hastings Algorithms for DSGE models*

Herbst and Schorfheide (2015), chapter 4, Smets and Wouters (2007), Christiano, Motto, and Rostagno (2014).

10. *Sequential Monte Carlo Methods*

Herbst and Schorfheide (2015), chapter 5.

11. *Other ways to estimate and validate DSGE frameworks and related issues and investigations*

Fernández-Villaverde, Rubio-Ramírez, Sargent, and Watson (2007), Canova and Sala (2009), Christiano, Eichenbaum, and Evans (2005), Leeper, Traum, and Walker (2017), Angeletos, Collard, and Dellas (2020).

References

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.

ANTOLÍN-DÍAZ, J., AND P. SURICO (2022): "The Long-Run Effects of Government Spending," .

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.

ARIAS, J. E., J. F. RUBIO-RAMÍREZ, AND D. F. WAGGONER (2018): "Inference Based on SVARs Identified with Sign and Zero Restrictions: Theory and Applications," *Econometrica*, 86(2), 685–720.

ASCARI, G., AND T. HABER (2021): "Non-linearities, state-dependent prices and the transmission mechanism of monetary policy," *Economic Journal*, forthcoming.

BAUMEISTER, C., AND J. D. HAMILTON (2015): "Sign Restrictions, Structural Vector Autoregressions, and Useful Prior Information," *Econometrica*, 83(5), 1963–1999.

CALDARA, D., AND C. KAMPS (2017): "The Analytics of SVARs: A Unified Framework to Measure Fiscal Multipliers," *Review of Economic Studies*, 84, 1015–1040.

CANOVA, F., AND G. DE NICOLÓ (2002): "Monetary Disturbances Matter for Business Fluctuations in the G-7," *Journal of Monetary Economics*, 49, 1131–1159.

CANOVA, F., AND L. SALA (2009): "Back to Square One: Identification Issues in DSGE Models," *Journal of Monetary Economics*, 56(4), 431–449.

CASTELNUOVO, E., AND P. SURICO (2010): "Monetary Policy Shifts, Inflation Expectations and the Price Puzzle," *Economic Journal*, 120(549), 1262–1283.

CHRISTIANO, L., M. EICHENBAUM, AND C. EVANS (2005): "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy*, 113(1), 1–45.

CHRISTIANO, L., R. MOTTO, AND M. ROSTAGNO (2014): "Risk Shocks," *American Economic Review*, 104(1), 27–65.

CHRISTIANO, L. J., M. EICHENBAUM, AND C. EVANS (1999): "Monetary Policy Shocks: What Have We Learned and to What End?," In: J.B. Taylor and M. Woodford (eds.): Handbook of Macroeconomics, Elsevier Science, 65–148.

FAUST, J. (1998): "The robustness of identified VAR conclusions about money," *Carnegie Rochester Conference Series on Public Policy*, 49, 207–244.

FERNÁNDEZ-VILLAVERDE, J., J. F. RUBIO-RAMÍREZ, T. J. SARGENT, AND M. W. WATSON (2007): "ABCs (and Ds) of Understanding VARs," *American Economic Review*, 97(3), 1021–1026.

FRY, R., AND A. PAGAN (2011): "Sign Restrictions in Structural Vector Autoregressions: A Critical Review," *Journal of Economic Literature*, 49(4), 938–960.

FURLANETTO, F., F. RAVAZZOLO, AND S. SARFERAZ (2019): "Identification of financial factors in economic fluctuations," *Economic Journal*, 129, 311–337.

GERTLER, M., AND P. KARADI (2015): "Monetary Policy Surprises, Credit Costs, and Economic Activity," *American Economic Journal: Macroeconomics*, 7(1), 44–76.

HERBST, E., AND F. SCHORFHEIDE (2015): "Bayesian Estimation of DSGE Models," Princeton University Press, Princeton University.

JAROCIŃSKI, M., AND P. KARADI (2020): "Deconstructing Monetary Policy Surprises: The Role of Information Shocks," *American Economic Journal: Macroeconomics*, 12(2), 1–43.

JORDÀ, O. (2005): "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, 95(1), 161–182.

KÄNZIG, D. (2021): "The macroeconomic effects of oil supply news: Evidence from OPEC announcements," *American Economic Review*, 111(4), 1092–1125.

KILIAN, L., AND H. LÜTKEPOHL (2017): "Structural Vector Autoregressive Analysis," Cambridge University Press, Cambridge.

KILIAN, L., AND D. MURPHY (2012): "Why Agnostic Sign Restrictions Are Not Enough: Understanding the Dynamics of Oil Market VAR Models," *Journal of the European Economic Association*, 10(5), 1166–1188.

KIM, S.-H., S. MOON, AND C. VELASCO (2017): "Delayed Overshooting: Is It an '80s Puzzle?," *Journal of Political Economy*, 125(5), 1570–1598.

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.

MERTENS, K., AND M. O. RAVN (2013): "The Dynamic Effecs of Personal and Corporate Income Tax Changes in the United States," *American Economic Review*, 103(4), 1212–1247.

PLAGBORG-MØLLER, M., AND C. K. WOLF (2020): "Local Projections and VARs Estimate the Same Impulse Responses," *Econometrica*, forthcoming.

RAMEY, V. A., AND S. ZUBAIRY (2018): "Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data," *Journal of Political Economy*, 126(2), 850–901.

RUBIO-RAMÍREZ, J. F., D. F. WAGGONER, AND T. ZHA (2010): "Structural Vector Autoregressions: Theory of Identification and Algorithms for Inference," *Review of Economic Studies*, 77, 665–696.

SIMS, C. (1980): "Macroeconomics and Reality," *Econometrica*, 48(1), 1–48.

SMETS, F., AND R. WOUTERS (2007): "Shocks and Frictions in US Business Cycle: A Bayesian DSGE Approach," *American Economic Review*, 97(3), 586–606.

STOCK, J., AND M. WATSON (2001): "Vector Autoregressions," *Journal of Economic Perspectives*, 15, 101–115.

STOCK, J., AND M. W. WATSON (2018): "Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments," *Economic Journal*, 128, 917–948.

TENREYRO, S., AND G. THWAITES (2016): "Pushing on a string: US monetary policy is less powerful in recessions," *American Economic Journal: Macroeconomics*, 8(4), 43–74.

UHLIG, H. (2005): "What Are the Effects of Monetary Policy? Results from an Agnostic Identification Procedure," *Journal of Monetary Economics*, 52, 381–419.

———— (2017): "Shocks, Sign Restrictions, and Identification," in Bo Honoré, Ariel Pakes, Monika Piazzesi, and Larry Samuelson (eds): Advances in Economics and Econometrics, Vol. 1 and 2: Eleventh World Congress, Chapter 4, Cambridge University Press, Cambridge.

WOLF, C. K. (2020): "SVAR (Mis-)Identification and the Real Effects of Monetary Policy," *American Economic Journal: Macroeconomics*, 12(4), 1–32.