416-2 Empirical Macroeconomics:

Identification, Heterogeneity, Aggregation

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Reading list

Essential readings are listed first and marked with a star (*). Other readings are included for your reference. Original contributions are not always cited when good handbook/textbook references are available. The reading list may be updated through the course.

1 Course overview & introduction

* Valerie A. Ramey. Macroeconomic shocks and their propagation. *Handbook of Macroeconomics*, 2:71–162, 2016

* Emi Nakamura and Jón Steinsson. Identification in macroeconomics. *Journal of Economic Perspectives*, 32(3):59–86, 2018b

Christopher A. Sims. Macroeconomics and reality. *Econometrica*, pages 1–48, 1980

John H. Cochrane. Shocks. In *Carnegie-Rochester Conference series on public policy*, volume 41, pages 295–364. Elsevier, 1994

Joshua D. Angrist and Jörn-Steffen Pischke. The credibility revolution in empirical economics: How better research design is taking the con out of econometrics. *Journal of Economic Perspectives*, 24(2):3–30, 2010

2 Linear time series methods

* James D. Hamilton. *Time Series Analysis*. Princeton University Press, 1994

Chapters 2-4, 10-11, 18

* Lutz Kilian and Helmut Lütkepohl. *Structural vector autoregressive analysis*. Cambridge University Press, 2017

Chapters 2.1-2.5, 4

Peter J. Brockwell and Richard A. Davis. *Time series: theory and methods*. Springer Science & Business Media, 2009

Chapters 1.1–1.5, 2.1–2.9, 3.1–3.5, 5.1–5.5, 5.7, 11.1–11.4

John H. Cochrane. Time series for macroeconomics and finance. *Manuscript, University of Chicago*, pages 1–136, 2005

Chapters 3-6, 8

3 Identification using time-series variation

3.1 Identification assumptions

3.1.1 Identification problem, invertibility

* Jesús Fernández-Villaverde, Juan F. Rubio-Ramírez, Thomas J. Sargent, and Mark W. Watson. ABCs (and Ds) of understanding VARs. *American Economic Review*, 97(3):1021–1026, 2007

Marco Lippi and Lucrezia Reichlin. VAR analysis, nonfundamental representations, Blaschke matrices. *Journal of Econometrics*, 63(1):307–325, 1994

Eric M. Leeper, Todd B. Walker, and Shu-Chun Susan Yang. Fiscal foresight and information flows. *Econometrica*, 81(3):1115–1145, 2013

Mario Forni, Luca Gambetti, and Luca Sala. Structural vars and noninvertible macroeconomic models. *Journal of Applied Econometrics*, 34(2):221–246, 2019

3.1.2 Short-run zero restrictions

* Lawrence J. Christiano, Martin Eichenbaum, and Charles L. Evans. Monetary policy shocks: What have we learned and to what end? *Handbook of Macroeconomics*, 1:65–148, 1999

Lawrence J. Christiano, Martin Eichenbaum, and Charles L. Evans. Nominal rigidities and the dynamic effects of a shock to monetary policy. *Journal of Political Economy*, 113(1):1–45, 2005

Olivier J. Blanchard and Roberto Perotti. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *The Quarterly Journal of Economics*, 117(4):1329–1368, 2002

Lutz Kilian. Not all oil price shocks are alike: disentangling demand and supply shocks in the crude oil market. *American Economic Review*, 99(3):1053–69, June 2009

3.1.3 Long- and medium-run restrictions

* Olivier J. Blanchard and Danny Quah. The dynamic effects of aggregate demand and aggregate supply. *American Economic Review*, 79(4):655–73, 1989

* Jon Faust and Eric M. Leeper. When do long-run identifying restrictions give reliable results? *Journal of Business & Economic Statistics*, 15(3):345–353, 1997

Harald Uhlig. Do technology shocks lead to a fall in total hours worked? *Journal of the European Economic Association*, 2(2-3):361–371, 2004

Robert B. Barsky and Eric R. Sims. News shocks and business cycles. *Journal of Monetary Economics*, 58(3):273–289, 2011

3.1.4 Sign restrictions

* Harald Uhlig. What are the effects of monetary policy on output? results from an agnostic identification procedure. *Journal of Monetary Economics*, 52(2):381–419, 2005

* Christian K. Wolf. What can we learn from sign-restricted vars? In *AEA Papers and Proceedings*, volume 112, pages 471–75, 2022

* Christiane Baumeister and James D. Hamilton. Sign restrictions, structural vector autoregressions, and useful prior information. *Econometrica*, 83(5):1963–1999, 2015

Juan F. Rubio-Ramirez, Daniel F. Waggoner, and Tao Zha. Structural vector autoregressions: Theory of identification and algorithms for inference. *The Review of Economic Studies*, 77(2): 665–696, 2010

Jonas E. Arias, Juan F. Rubio-Ramirez, and Daniel F. Waggoner. Uniform priors for impulse responses. Technical report, 2020

Raffaella Giacomini and Toru Kitagawa. Robust bayesian inference for set-identified models. *Econometrica*, 89(4):1519–1556, 2021

Christian K. Wolf. Svar (mis) identification and the real effects of monetary policy shocks. *American Economic Journal: Macroeconomics*, 12(4):1–32, 2020

3.1.5 Statistical identification

* Lutz Kilian and Helmut Lütkepohl. *Structural vector autoregressive analysis*. Cambridge University Press, 2017

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* Markus Brunnermeier, Darius Palia, Karthik A. Sastry, and Christopher A. Sims. Feedbacks: financial markets and economic activity. *American Economic Review*, 111(6):1845–79, 2021

Roberto Rigobon. Identification through heteroskedasticity. *Review of Economics and Statistics*, 85(4):777–792, 2003

Christian Gouriéroux, Alain Monfort, and Jean-Paul Renne. Statistical inference for independent component analysis: Application to structural VAR models. *Journal of Econometrics*, 196(1):111–126, 2017

José Luis Montiel Olea, Mikkel Plagborg-Møller, and Eric Qian. SVAR Identification From Higher Moments: Has the Simultaneous Causality Problem Been Solved? In *AEA Papers and Proceedings*, volume 112, pages 481–85, 2022

3.1.6 Instrumental variable approach

* James H. Stock and Mark W. Watson. Identification and estimation of dynamic causal effects in macroeconomics using external instruments. *The Economic Journal*, 128(610):917–948, 2018

* Karel Mertens and Morten O. Ravn. The dynamic effects of personal and corporate income tax changes in the united states. *American Economic Review*, 103(4):1212–47, June 2013. doi: 10.1257/aer.103.4.1212. URL http://www.aeaweb.org/articles?id=10.1257/aer.103.4.1212

Mikkel Plagborg-Møller and Christian K. Wolf. Instrumental variable identification of dynamic variance decompositions. 2020

Silvia Miranda-Agrippino and Giovanni Ricco. Identification with external instruments in structural vars under partial invertibility. 2018

Carsten Jentsch and Kurt G. Lunsford. Proxy svars: asymptotic theory, bootstrap inference, and the effects of income tax changes in the united states. 2016

Carsten Jentsch and Kurt G. Lunsford. The dynamic effects of personal and corporate income tax changes in the united states: Comment. *American Economic Review*, 109(7):2655–78, July 2019. doi: 10.1257/aer.20162011. URL http://www.aeaweb.org/articles?id=10.1257/aer.20162011

Karel Mertens and Morten O. Ravn. The dynamic effects of personal and corporate income tax changes in the united states: Reply. *American Economic Review*, 109(7):2679–91, July 2019. doi: 10.1257/aer.20180707. URL http://www.aeaweb.org/articles?id=10.1257/aer.20180707

3.1.7 Other invertibility robust methods

* Ben S. Bernanke, Jean Boivin, and Piotr Eliasz. Measuring the effects of monetary policy: a factor-augmented vector autoregressive (favar) approach. *The Quarterly Journal of Economics*, 120(1):387–422, 2005

Ryan Chahrour and Kyle Jurado. Recoverability and expectations-driven fluctuations. *The Review of Economic Studies*, 89(1):214–239, 2022

Christian Gouriéroux, Alain Monfort, and Jean-Paul Renne. Identification and estimation in non-fundamental structural varma models. *The Review of Economic Studies*, 87(4):1915–1953, 2020

Mikkel Plagborg-Møller. Bayesian inference on structural impulse response functions. *Quantitative Economics*, 10(1):145–184, 2019

3.2 Estimation strategies

* Òscar Jordà. Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182, 2005

* Òscar Jordà and Alan M Taylor. Local projections. 2024

* Mikkel Plagborg-Møller and Christian K. Wolf. Local projections and VARs estimate the same impulse responses. 2021

Carsten Jentsch and Kurt G. Lunsford. The dynamic effects of personal and corporate income tax changes in the united states: Comment. *American Economic Review*, 109(7):2655–78, July 2019. doi: 10.1257/aer.20162011. URL http://www.aeaweb.org/articles?id=10.1257/aer.20162011

José Luis Montiel Olea and Mikkel Plagborg-Møller. Local projection inference is simpler and more robust than you think. *Econometrica*, 89(4):1789–1823, 2021

Regis Barnichon and Christian Brownlees. Impulse response estimation by smooth local projections. *Review of Economics and Statistics*, 101(3):522–530, 2019

Silvia Miranda-Agrippino, Giovanni Ricco, et al. *Bayesian local projections*. University of Warwick, Department of Economics, 2021

Dake Li, Mikkel Plagborg-Møller, and Christian K. Wolf. Local Projections vs. VARs: Lessons From Thousands of DGPs. 2021

3.3 Finding instruments in macro

3.3.1 Narrative approach

Narrative monetary shocks

* Christina D. Romer and David H. Romer. A new measure of monetary shocks: Derivation and implications. *American Economic Review*, 94(4):1055–1084, 2004

* Boragan Aruoba and Thomas Drechsel. Identifying monetary policy shocks: A natural language approach. 2022

Milton Friedman and Anna Jacobson Schwartz. *A monetary history of the United States, 1867-1960*, volume 16. Princeton University Press, 1963

Christina D. Romer and David H. Romer. Monetary policy matters. *Journal of Monetary Economics*, 34(1):75–88, 1994

Christina D. Romer and David H. Romer. Does monetary policy matter? a new test in the spirit of friedman and schwartz. *NBER macroeconomics annual*, 4:121–170, 1989

Narrative fiscal shocks

* Valerie A. Ramey. Identifying government spending shocks: It's all in the timing. *The Quarterly Journal of Economics*, 126(1):1–50, 2011

* Christina D. Romer and David H. Romer. The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks. *American Economic Review*, 100(3):763–801, 2010

* Karel Mertens and Morten O. Ravn. Empirical evidence on the aggregate effects of anticipated and unanticipated us tax policy shocks. *American Economic Journal: Economic Policy*, 4(2):145–81, 2012

Valerie A Ramey and Matthew D Shapiro. Costly capital reallocation and the effects of government spending. In *Carnegie-Rochester conference series on public policy*, volume 48, pages 145–194. Elsevier, 1998

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Karel Mertens and Morten O. Ravn. A reconciliation of SVAR and narrative estimates of tax multipliers. *Journal of Monetary Economics*, 68:S1–S19, 2014

Juan Antolin-Diaz and Paolo Surico. The long-run effects of government spending. Technical report, Tech. rep., mimeographed, London Business School, 2022

James Cloyne, Joseba Martinez, Haroon Mumtaz, and Paolo Surico. Short-term tax cuts, long-term stimulus. Technical report, National Bureau of Economic Research, 2022

Narrative oil and news shocks

* Lutz Kilian. Exogenous oil supply shocks: how big are they and how much do they matter for the us economy? *The Review of Economics and Statistics*, 90(2):216–240, 2008

* Rabah Arezki, Valerie A. Ramey, and Liugang Sheng. News shocks in open economies: Evidence from giant oil discoveries. *The Quarterly Journal of Economics*, 132(1):103–155, 2017

Lutz Kilian. Not all oil price shocks are alike: disentangling demand and supply shocks in the crude oil market. *American Economic Review*, 99(3):1053–69, June 2009

James D. Hamilton. What is an oil shock? *Journal of Econometrics*, 113(2):363–398, 2003

3.3.2 High-frequency identification

* Refet S. Gürkaynak, Brian Sack, and Eric T. Swanson. Do actions speak louder than words? the response of asset prices to monetary policy actions and statements. *International Journal of Central Banking*, 1:55–93, 2005

* Emi Nakamura and Jón Steinsson. High-frequency identification of monetary non-neutrality: the information effect. *The Quarterly Journal of Economics*, 133(3):1283–1330, 2018a

* Mark Gertler and Peter Karadi. Monetary policy surprises, credit costs, and economic activity. *American Economic Journal: Macroeconomics*, 7(1):44–76, 2015

* Michael Bauer and Eric T. Swanson. An alternative explanation for the 'fed information effect'. *Available at SSRN 3551950*, 2021

* Diego R. Känzig. The macroeconomic effects of oil supply news: Evidence from opec announcements. *American Economic Review*, 111(4):1092–1125, April 2021. doi: 10.1257/aer.20190964. URL https://www.aeaweb.org/articles?id=10.1257/aer.20190964

Timothy Cook and Thomas Hahn. The effect of changes in the federal funds rate target on market interest rates in the 1970s. *Journal of Monetary Economics*, 24(3):331–351, 1989

Kenneth N. Kuttner. Monetary policy surprises and interest rates: Evidence from the fed funds futures market. *Journal of Monetary Economics*, 47(3):523–544, 2001

Joshua D. Angrist, Òscar Jordà, and Guido M. Kuersteiner. Semiparametric estimates of monetary policy effects: string theory revisited. *Journal of Business & Economic Statistics*, 36 (3):371–387, 2018

Roberto Rigobon and Brian Sack. The impact of monetary policy on asset prices. *Journal of Monetary Economics*, 51(8):1553–1575, 2004

Marek Jarociński and Peter Karadi. Deconstructing monetary policy surprises—the role of information shocks. *American Economic Journal: Macroeconomics*, 12(2):1–43, 2020

Silvia Miranda-Agrippino and Giovanni Ricco. The transmission of monetary policy shocks. *American Economic Journal: Macroeconomics*, 13(3):74–107, 2021

Michael D. Bauer and Eric T. Swanson. A reassessment of monetary policy surprises and high-frequency identification. Technical report, National Bureau of Economic Research, 2022

3.3.3 Other external information

* Christiane Baumeister and James D. Hamilton. Structural interpretation of vector autoregressions with incomplete identification: Revisiting the role of oil supply and demand shocks. *American Economic Review*, 109(5):1873–1910, May 2019. doi: 10.1257/aer.20151569. URL http://www.aeaweb.org/articles?id=10.1257/aer.20151569

* Juan Antolín-Díaz and Juan F. Rubio-Ramírez. Narrative sign restrictions for svars. *American Economic Review*, 108(10):2802–29, October 2018. doi: 10.1257/aer.20161852. URL http://www.aeaweb.org/articles?id=10.1257/aer.20161852

Dario Caldara, Michele Cavallo, and Matteo Iacoviello. Oil price elasticities and oil price fluctuations. *Journal of Monetary Economics*, 103:1–20, 2019

Christiane Baumeister and James D. Hamilton. Inference in structural vector autoregressions when the identifying assumptions are not fully believed: Re-evaluating the role of monetary policy in economic fluctuations. *Journal of Monetary Economics*, 100:48–65, 2018

Mark W. Watson. Comment on "on the empirical (ir) relevance of the zero lower bound constraint". Technical report, National Bureau of Economic Research, 2019

3.4 Challenges with time-series approach

* Sílvia Gonçalves, Ana María Herrera, Lutz Kilian, and Elena Pesavento. When do state-dependent local projections work? 2022

* Valerie A. Ramey and Sarah Zubairy. Government spending multipliers in good times and in bad: evidence from us historical data. *Journal of Political Economy*, 126(2):850–901, 2018

* Christian K. Wolf and Alisdair McKay. What can time-series regressions tell us about policy counterfactuals? Technical report, National Bureau of Economic Research, 2022

Gary Koop, Hashem M. Pesaran, and Simon M. Potter. Impulse response analysis in nonlinear multivariate models. *Journal of Econometrics*, 74(1):119–147, 1996

Christopher J. Nekarda and Valerie A. Ramey. Industry evidence on the effects of government spending. *American Economic Journal: Macroeconomics*, 3(1):36–59, 2011

3.5 Macro shocks and micro data: macro–to–micro

3.5.1 Household heterogeneity

* Olivier Coibion, Yuriy Gorodnichenko, Lorenz Kueng, and John Silvia. Innocent bystanders? monetary policy and inequality. *Journal of Monetary Economics*, 88:70–89, 2017

* James Cloyne, Clodomiro Ferreira, and Paolo Surico. Monetary policy when households have debt: new evidence on the transmission mechanism. *The Review of Economic Studies*, 87(1):102–129, 2020

* Diego R Känzig. The economic consequences of putting a price on carbon. *Available at SSRN 3786030*, 2022

* Martin Blomhoff Holm, Pascal Paul, and Andreas Tischbirek. The transmission of monetary policy under the microscope. *Journal of Political Economy*, 129(10):2861–2904, 2021

James Cloyne and Paolo Surico. Household debt and the dynamic effects of income tax changes. *The Review of Economic Studies*, 84(1):45–81, 2017

Minsu Chang, Xiaohong Chen, and Frank Schorfheide. Heterogeneity and aggregate fluctuations. Technical report, National Bureau of Economic Research, 2021

3.5.2 Firm heterogeneity

* Pablo Ottonello and Thomas Winberry. Financial heterogeneity and the investment channel of monetary policy. *Econometrica*, 88(6):2473–2502, 2020

* James Cloyne, Clodomiro Ferreira, Maren Froemel, and Paolo Surico. Monetary policy, corporate finance and investment. Technical report, National Bureau of Economic Research, 2018

Thomas Drechsel. Earnings-based borrowing constraints and macroeconomic fluctuations. *DP16975*, 2022

Priit Jeenas. Firm balance sheet liquidity, monetary policy shocks, and investment dynamics. *Work*, 5, 2019

4 Identification using cross-sectional variation: micro–to–macro

4.1 Using simple micro moments to discipline macro models

* Emi Nakamura and Jón Steinsson. Price rigidity: Microeconomic evidence and macroeconomic implications. *Annual Review of Economics*, 5(1):133–163, 2013

Mark Bils and Peter J. Klenow. Some evidence on the importance of sticky prices. *Journal of Political economy*, 112(5):947–985, 2004

Emi Nakamura and Jón Steinsson. Five facts about prices: A reevaluation of menu cost models. *The Quarterly Journal of Economics*, 123(4):1415–1464, 2008

Patrick Kehoe and Virgiliu Midrigan. Prices are sticky after all. *Journal of Monetary Economics*, 75:35–53, 2015

4.2 Identified moments

4.2.1 Evidence on individual MPCs

* John Y. Campbell and N. Gregory Mankiw. Consumption, income, and interest rates: Reinterpreting the time series evidence. *NBER macroeconomics annual*, 4:185–216, 1989

* Jonathan A. Parker, Nicholas S. Souleles, David S. Johnson, and Robert McClelland. Consumer spending and the economic stimulus payments of 2008. *American Economic Review*, 103(6):2530–53, 2013

* Kanishka Misra and Paolo Surico. Consumption, income changes, and heterogeneity: Evidence from two fiscal stimulus programs. *American Economic Journal: Macroeconomics*, 6(4): 84–106, 2014

* Andreas Fuster, Greg Kaplan, and Basit Zafar. What would you do with 500? spending responses to gains, losses, news, and loans. *The Review of Economic Studies*, 88(4):1760–1795, 2021

* Greg Kaplan and Giovanni L. Violante. The marginal propensity to consume in heterogeneous agent models. *Annual Review of Economics*, 14:747–775, 2022

David S. Johnson, Jonathan A. Parker, and Nicholas S. Souleles. Household expenditure and the income tax rebates of 2001. *American Economic Review*, 96(5):1589–1610, December 2006. doi: 10.1257/aer.96.5.1589. URL https://www.aeaweb.org/articles?id=10.1257/aer.96.5.1589

Chang-Tai Hsieh. Do consumers react to anticipated income changes? evidence from the alaska permanent fund. *American Economic Review*, 93(1):397–405, 2003

Lorenz Kueng. Revisiting the response of household spending to the alaska permanent fund dividend using ce data. *Available at SSRN 2634005*, 2015

Tullio Jappelli and Luigi Pistaferri. Fiscal policy and mpc heterogeneity. *American Economic Journal: Macroeconomics*, 6(4):107–36, 2014

Greg Kaplan, Justin Weidner, and Giovanni L. Violante. The wealthy hand-to-mouth. *Brookings Papers on Economic Activity*, 2014

Andreas Fagereng, Martin B Holm, and Gisle J Natvik. Mpc heterogeneity and household balance sheets. *American Economic Journal: Macroeconomics*, 13(4):1–54, 2021

Daniel J. Lewis, Davide Melcangi, and Laura Pilossoph. Latent heterogeneity in the marginal propensity to consume. *FRB of New York Staff Report*, (902), 2019

4.2.2 Regional fiscal multipliers

* Daniel Shoag. The impact of government spending shocks: Evidence on the multiplier from state pension plan returns. *unpublished paper, Harvard University*, 2012

* Gabriel Chodorow-Reich, Laura Feiveson, Zachary Liscow, and William Gui Woolston. Does state fiscal relief during recessions increase employment? evidence from the american recovery and reinvestment act. *American Economic Journal: Economic Policy*, 4(3):118–45, 2012

* Emi Nakamura and Jon Steinsson. Fiscal stimulus in a monetary union: Evidence from US regions. *American Economic Review*, 104(3):753–92, 2014

Juan Carlos Suárez Serrato and Philippe Wingender. Estimating local fiscal multipliers. Technical report, National Bureau of Economic Research, 2016

James H. Stock, Jonathan H. Wright, and Motohiro Yogo. A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20(4):518–529, 2002

Paul Goldsmith-Pinkham, Isaac Sorkin, and Henry Swift. Bartik instruments: What, when, why, and how. *American Economic Review*, 110(8):2586–2624, 2020

Kirill Borusyak, Peter Hull, and Xavier Jaravel. Quasi-experimental shift-share research designs. *The Review of Economic Studies*, 89(1):181–213, 2022

4.3 Aggregation

* Emi Nakamura and Jon Steinsson. Fiscal stimulus in a monetary union: Evidence from US regions. *American Economic Review*, 104(3):753–92, 2014

* Gabriel Chodorow-Reich. Geographic cross-sectional fiscal spending multipliers: What have we learned? *American Economic Journal: Economic Policy*, 11(2):1–34, 2019

* Christian K Wolf. The missing intercept: A demand equivalence approach. Technical report, National Bureau of Economic Research, 2021

Kilian Huber. Disentangling the effects of a banking crisis: Evidence from german firms and counties. *American Economic Review*, 108(3):868–98, 2018

Adam Guren, Alisdair McKay, Emi Nakamura, and Jón Steinsson. What do we learn from cross-regional empirical estimates in macroeconomics? *NBER Macroeconomics Annual*, 35 (1):175–223, 2021

Vasco M. Carvalho, Makoto Nirei, Yukiko U Saito, and Alireza Tahbaz-Salehi. Supply chain disruptions: Evidence from the great east japan earthquake. *Quarterly Journal of Economics*, 136(2):1255–1321, 2021