DIW Graduate Center Masterclass: Effects of Shocks in Nonlinear and Non-Gaussian Environments

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Instructor: Christian Matthes, matthesc@iu.edu

Time and place of class: October 7th-9th, 13:30-15:00 & 15:15-16:45. Room TBA

What this course is about: The study of nonlinearities permeates modern macroeconomics. This course will introduce tools to estimate the possibly nonlinear effects of various (possibly non-Gaussian) economic shocks. The tools/models we will cover come in two classes:

1. Models where nonlinearities and non-Gaussianity help to identify shocks

2. Models where identification assumptions (such as instruments) are borrowed from linear models.

We will study both approaches in detail. Whenever feasible, we will look at example codes (written mostly in Matlab).

Prerequisites: I will assume knowledge of linear time series models and some Bayesian econometrics - i.e. I will use terminology such as 'Gibbs Sampling' or 'MCMC' without first deriving these algorithms or proving under what conditions they work. I'll be happy to provide background reading on these topics.

Course Outline: We will have 6 classes. Below I list the topics for each class and some representative literature.

1. Identification of nonlinear Effects via Direct Estimation of Moving Average Models
   Barnichon and Matthes (2018), Barnichon et al. (2022),Barnichon et al. (2022)

2. Tail risks
   Adrian et al. (2019), Loria et al. (2019)

3. Identification via Non-Gaussianity
   Lewis (2021), Lewis (2024), Jarociński (2021)

4. Time-Varying Parameter VARs
   Cogley and Sargent (2002), Primiceri (2005), Del Negro and Primiceri (2015), Amir-Ahmadi et al. (2020)

5. Instruments and Time-Varying Parameters
   Mumtaz and Petrova (2023), Amir-Ahmadi et al. (2023)

6. Time Variation as a Direct Function of Observables
   Gargiulo et al. (2024), Kim et al. (2021)

References

Adrian, T., N. Boyarchenko, and D. Giannone (2019, April). Vulnerable Growth. *American Economic Review 109*(4), 1263–1289.

Amir-Ahmadi, P., C. Matthes, and M.-C. Wang (2020, January). Choosing Prior Hyperparameters: With Applications to Time-Varying Parameter Models. *Journal of Business & Economic Statistics 38*(1), 124–136.

Amir-Ahmadi, P., C. Matthes, and M.-C. Wang (2023, November). Understanding instruments in macroeconomics: A study of high-frequency identification. Available at `https://cm1518.github.io/files/Proxy_VAR_.pdf`.

Barnichon, R., D. Debortoli, and C. Matthes (2022). Understanding the Size of the Government Spending Multiplier: It's in the Sign . *The Review of Economic Studies 89*(1), 87–117.

Barnichon, R. and C. Matthes (2018). Functional approximation of impulse responses. *Journal of Monetary Economics 99*, 41–55.

Barnichon, R., C. Matthes, and A. Ziegenbein (2022, May). Are the Effects of Financial Market Disruptions Big or Small? *The Review of Economics and Statistics 104*(3), 557–570.

Cogley, T. and T. J. Sargent (2002, January). Evolving Post-World War II US Inflation Dynamics. In *NBER Macroeconomics Annual 2001, Volume 16*, NBER Chapters, pp. 331–388. National Bureau of Economic Research, Inc.

Del Negro, M. and G. E. Primiceri (2015). Time Varying Structural Vector Autoregressions and Monetary Policy: A Corrigendum. *Review of Economic Studies 82*(4), 1342–1345.

Gargiulo, V., C. Matthes, and K. Petrova (2024, January). Monetary Policy across Inflation Regimes. Staff Reports 1083, Federal Reserve Bank of New York.

Jarociński, M. (2021, August). Estimating the Fed's Unconventional Policy Shocks. Working Paper Series 20210, European Central Bank.

Kim, H. S., C. Matthes, and T. Phan (2021, August). Extreme Weather and the Macroeconomy. Working Paper 21-14, Federal Reserve Bank of Richmond.

Lewis, D. (2024, February). Identification based on higher moments. CeMMAP working papers 03/24, Institute for Fiscal Studies.

Lewis, D. J. (2021). Identifying Shocks via Time-Varying Volatility [First Order Autoregressive Processes and Strong Mixing]. *The Review of Economic Studies 88*(6), 3086–3124.

Loria, F., C. Matthes, and D. Zhang (2019, April). Assessing Macroeconomic Tail Risk. Finance and Economics Discussion Series 2019-026, Board of Governors of the Federal Reserve System (U.S.).

Mumtaz, H. and K. Petrova (2023, March). Changing Impact of Shocks: A Time-Varying Proxy SVAR Approach. *Journal of Money, Credit and Banking 55*(2-3), 635–654.

Primiceri, G. E. (2005). Time Varying Structural Vector Autoregressions and Monetary Policy. *Review of Economic Studies 72*(3), 821–852.