

**University of Kansas
Department of Economics**

**Economics 911
Applied Macroeconomics**

**Spring 2023
Professor Keating**

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where there is a link to Econ 911 course materials, under Spring 2023 courses

Zoom Office Hours: Mondays and Wednesdays: 12:45-2:45 pm.

Course Description: This is an advanced PhD-level course in macroeconomics, primarily concerned with macroeconomic topics. We study important macroeconomic questions using various tools of applied economic analysis. Actually, all of the tools may have applications in applied microeconomics. The course will focus on developing empirical techniques that can identify structure from time-series data. Many applications will use some type of structural vector autoregression (SVAR) model. We will emphasize issues pertaining to structural identification and de-emphasize, though not ignore, statistical inference. A few aspects of dynamic stochastic general equilibrium (DSGE) models will also be addressed.

Grading: is based on a midterm examination and possibly also a paper. If you don't hand in a paper then you have selected the NO PAPER OPTION. In that case your course grade will be one letter grade lower than your midterm grade. If you also hand in a paper, then the paper and the midterm are given equal weight in the course grade.

Exam: is an open book test. However, you are not permitted to communicate about this exam with anyone else except me about the exam while taking it. (I will answer clarifying questions). I intend for it to be a take-home exam and for it to be given near the end of the semester. Starting and ending dates/times are negotiable with the class. But if we are unable to arrange a mutually agreeable date for the exam, it will be administered during the final exam period. In this case you would be allowed no more than 3 hours to take the exam. Test questions may be drawn from any material covered in class prior to handing out the exam.

Paper: There are two options: (1) PAPER OPTION: write a paper that includes some original research; (2) NO PAPER OPTION. If you select the Paper Option, but fail to provide me with a paper, then by default you will have selected the No Paper Option.

No Paper Option: Your course grade is one letter grade below your grade on the Midterm (e.g. if you get an A- on the midterm, you will be given a B- for the course). This is the default option if you fail to tell me otherwise. Also, if the deadline passes and you have not submitted your paper nor established a new deadline (i.e. you have not re-contracted with me), then by default you will have selected the No Paper option.

Paper Option: The paper serves as a final exam. A hard copy of it is due during our final exam period which is scheduled for Monday, May 8, 1:30 pm to 4 pm. However, I am willing to give an incomplete if your paper is not ready in time. This has been done before, in fact, more often than not students have taken an incomplete.

NOTE: if unable to hand in your paper by the initial deadline, you must inform me in e-mail the date you will be handing it in.

The paper should be based on your own research on an interesting/important macroeconomic topic. You will write a paper that documents what your work has accomplished, how your work is related to existing research (e.g. it may complement, question, or refute other research), what macroeconomic implications derive from your research, and where this research should go next.

The paper's topic can be theoretical and/or empirical on anything that interests you, subject to the

constraint that it have macroeconomic implications. If the paper is not obviously a macroeconomics paper, you must make some effort to explain what are its macroeconomic implications. Hence, the range of topics is fairly broad. Your paper is allowed to provide a careful review of the relevant literature. A review might be very helpful for you, but your paper should attempt to break new ground with some original work. Your grade for the paper will be based on how much you are trying to accomplish, how well your research plan is designed to answer the questions you address, and how well you answer those questions. In other words, your paper can not merely be a review of a literature.

It is optimal for you to be writing a paper that will become a chapter in your dissertation. But that is certainly not a requirement. An easy way to perform new research is to apply an existing method to a new data set or alternatively to make some small but significant and hopefully important modification to someone else's model. If the model is theoretical then you would determine how it predicts the economy behaves differently under your new assumption compared with a body of existing research. If the model is econometric you should estimate it, and then examine how well (or poorly) your model based new data, new assumptions, etc. does compared with existing research.

My Web Page: <http://www.people.ku.edu/~jkeating/> has the link to this course (Econ 911) in 2023 Classes. I will use my Web page to distribute important course materials (e.g. homework assignments, syllabus, etc.). However, if there is something that I don't wish to make publically available (for example, something can not be posted on a web page if subject to copyright laws) I will use Canvas. (I do not post grades on Canvas). My lecture notes are posted on Canvas.

Readings: The list of articles and books on this syllabus is enormous. I don't believe it is humanly possible to read all of these selections in a year, much less one semester. And there are many more topics below than we can possibly cover in one semester. I only expect you to be familiar with material that I stress in class or that you find particularly interesting. You probably should read all the articles and books in any topic on the syllabus you want to become an expert.

Textbooks: I don't follow a textbook. But there are 4 that I think are terrific texts. None are literally required. In the reading list below you will often see a KEYWORD accompanied by chapter and/or subsection number to indicate relevant readings from a book or a set of on-line lectures notes:

K&L = *Structural Vector Autoregressive Analysis*, Lutz Kilian and Helmut Lütkepohl, Cambridge University Press, 2017.

Preliminary versions of chapters can be found at:

<http://www-personal.umich.edu/~lkilian/book.html> - the book will be available October 2017.

ENDERS = *Applied Econometric Time Series*, 4th ed., Walter Enders, Wiley Press, 2014;

TSA = *Time Series Analysis*, Jim Hamilton, Princeton University Press, 1994;

HELMUT = *New Introduction to Multiple Time Series Analysis*, 2nd ed., Helmut Lütkepohl, Springer, 2005.

On-line there is also a set of free and very useful time series notes:

COCHRANE = [*Time Series for Macroeconomics and Finance*](#), John Cochrane's intro to time series.

Other Text Resources: There are also various other books that you should have access to. I suggest you obtain any book that will benefit you in completing your dissertation or in your professional career, of course subject to your budget constraint.

Macroeconometrics and Macro Theory:

Methods for Applied Macroeconometric Research, Fabio Canova, Princeton, 2007.

Macro/Monetary Theory:

Interest and Prices: Foundations of a Theory of Monetary Policy, Michael Woodford, Princeton University Press, 2003;

Monetary Theory and Policy, 3rd ed., Carl E. Walsh, MIT Press, 2010;

On-line Texts: The list of on-line material continues to grow. Some that is relevant:

[Modern Macro-Econometrics](#), a course by Adrian Pagan & Richard Dennis, taught at the Center for Applied Macroeconomic Analysis at the Australian National University.

[Econometrics Lecture Notes](#) by Herman Bierens for advanced course work;

[Time Series Analysis Lecture Notes](#) for an advanced time series econometrics course at MIT;

[Time Series Econometrics Lecture Notes](#) by Eric Zivot.

On-line Video Resources:

“Time-Series Econometrics” J. Stock and M. Watson, Continuing Education, 2019 AEA Meetings
What’s New in Econometrics - Time Series, Summer Institute 2008, Lectures by J. Stock & M. Watson:
http://www.nber.org/minicourse_2008.html

Computational Tools & Macroeconomic Applications, Summer Institute 2011, L. Christiano and J. Fernandez-Villaverde teach courses : http://www.nber.org/econometrics_minicourse_2011/

The syllabus has many references to National Bureau of Economic Research Working Papers (denoted NBER WP). Since the Economics Department subscribes to this series you can download these papers for yourself or use the department’s hard copy (if you can find it) to make a copy for yourself. The syllabus references other working papers, some which come from other universities and some from the Federal Reserve System. Most items from the 12 Federal Reserve Banks and from the Board of Governors of the Federal Reserve System may be downloaded from the Web.

The University subscribes to most of the journals referenced here, and therefore many published papers are available on the Web (Google “KU e-journals”. And JSTOR allows you to download articles from a wide selection of journals.

Statistical Programs, should you need them to write the paper, the choice is left to your own discretion. MATLAB has become very popular for scientific computations. I sometimes also like RATS because I was trained on it and because it makes a lot of time series estimation fairly simple. If you decide to use RATS programming language, you may want to get the *RATS Handbook for Econometric Time Series* (Wiley) by Walter Enders. This manual helps you easily accomplish a lot of important tasks in RATS. Various texts can be purchased from Estima (the producer of RATS software), the publisher or from the Web. I’m guessing many of you really like E-Views because this software package allows you to easily implement many complicated econometric techniques. But ease of use has its costs with E-Views, as it is not as flexible for doing some things out of the ordinary. It is better than it used to for somewhat more complicated programming needs.

Additional Abbreviations:

ECMT=Econometrica

JMCB=Journal of Money, Credit, and Banking

QJE=Quarterly Journal of Economics

CRCS=Carnegie-Rochester Conference Series

JPE=Journal of Political Economy

EER=European Economics Review

JMACRO=Journal of Macroeconomics

HBECMTS=Handbook of Econometrics

JBES=Journal of Business and Economic Statistics

BPEA=Brookings Papers on Economic Activity

AER=American Economic Review

RESTAT=Review of Economics and Statistics

JME=Journal of Monetary Economics

JFE=Journal of Financial Economics

JEDC=Journal of Economic Dynamics and Control

JECMTS=Journal of Econometrics

Course Outline

1. Introduction to Identification and Time Series Analysis

* J.H. Stock & M.W. Watson “Twenty Years of Time Series Econometrics in Ten Pictures” *Journal of Economic Perspectives*, 2017, 59-86

Articles from *Symposium on Econometric Tools, Journal of Economic Perspectives*, Fall 2001:

“Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments” by Joshua D. Angrist and Alan B. Krueger, 69-87;

“Applications of Generalized Method of Moments Estimation” Jeffrey M. Wooldridge, 87-100;

“Vector Autoregressions” by James H. Stock and Mark W. Watson, 101-116;

“The New Econometrics of Structural Change: Dating Breaks in U.S. Labor Productivity” by Bruce E. Hansen, 117-128;

“The Bootstrap and Multiple Imputations: Harnessing Increased Computing Power for Improved Statistical Tests” by David Brownstone and Robert Valletta, 129-142

Slutsky E. "The Summation of Random Causes as the Source of Cyclic Processes" ECMT 1937, 105-146

Frisch R. "Propagation and Impulse Problems in Dynamic Economics," in R.A. Gordon and L.R. Klein, *Readings in Business Cycles*, 1965, 155-185

Haavelmo, T. “The probability approach in econometrics”, Supplement to *Econometrica* 12, July 1944

Sargent, T. J. *Macroeconomic Theory*, 1987, Academic Press, 285-288

Sims C., Notes on approximation by finite AR's, Wold representation:

<http://sims.princeton.edu/yftp/ApplEmet14/Innovations.pdf>

Sims C., Notes: Wold decomposition: <http://sims.princeton.edu/yftp/Times16/WoldDecomp.pdf>

2. Tools for Dynamic Analysis

K&L: 1,2,6,7

ENDERS: 1,2,5

TSA: 1,2,3,4,10,11

HELMUT: 1,2,3,4

COCHRANE: 1,2,3,4,5,6,7

Lütkepohl H. (2013) “Vector Autoregressive Models” prepared for the *Handbook of Research Methods and Applications in Empirical Macroeconomics*, Hashimzade, N., and M. Thornton (eds.), Camberley, UK: Edward Elgar.

Kilian, L. (2013) "Structural Vector Autoregressions" prepared for the *Handbook of Research Methods and Applications in Empirical Macroeconomics*, Hashimzade, N., and M. Thornton (eds.), Camberley, UK: Edward Elgar.

Sims, Christopher A. "Macroeconomics and Reality," ECMT 1980, 1-48

Cooley, T. and S. LeRoy "Atheoretical Macroeconomics: A Critique" JME 1985, 283-308

Keating J. "Structural Approaches to Vector Autoregressions," St. Louis Fed *Review* 1992, 37-57

* Watson M. "Vector Autoregressions and Cointegration" HBECMTS chapter 47, section 4

2A. Bayesian VAR models

K&L: 5, 16.3

HELMUT: 5.4

TSA: 12

Doan, T., R.Litterman and C.Sims "Forecasting and Conditional Projection Using Realistic Prior Distributions," *Econometric Reviews* 1984, 1-144

Litterman, R. "Forecasting With Bayesian Vector Autoregressions—Five Years of Experience," *Journal of Business and Economic Statistics* 1986, 25-38

Ingram B. and C. Whiteman "Supplanting the Minnesota prior: Forecasting Macroeconomic Time Series Using Real Business Cycle Model Priors" JME 1994

Robertson J. and E. Tallman "Vector Autoregressions: Forecasting and Reality" *Atlanta Fed Review* 1999, 4-18

Sims C. & T. Zha "Bayesian Methods for Dynamic Multivariate Models" *International Economic Review*; 39(4), November 1998, pages 949-68.

* Giannone D., Lenza M., and Primaceri G. (2015) "Prior Selection for Vector Autoregressions" *RESTAT*, 412-435.

Marco Del Negro & Frank Schorfheide, 2004. "Priors from General Equilibrium Models for VARs," *International Economic Review*, vol. 45(2), pages 643-673

Sims C, Notes on the Minnesota prior for VAR's:

<http://sims.princeton.edu/yftp/Applymet14/MNprior14.pdf>

2B. Asymmetric VAR models

Helmut: 5

Hsiao, C. "Autoregressive Modeling and Money-Income Causality Detection," JME 1981, 85-106

Gordon R.J. and S. King "The Output Cost of Inflation in Traditional and Vector Autoregressive Models," BPEA 1982, 205-44

* Keating J. "Macroeconomic Modeling with Asymmetric Vector Autoregressions," JMACRO 2000

W. Barnett, U. Chae, J. Keating (2006) "The Discounted Economic Stock of Money with VAR Forecasts" *Annals of Finance*, 2:229–258

2C. Inference on the Moving Average Representation (MAR)

Lütkepohl H. "Asymptotic of Impulse responses and Forecast Error Variance Decompositions in VAR Models" *RESTAT* 1990

Mittnik S. and P. Zadrozny "Asymptotic Distributions of Impulse Responses, Step Responses, and Variance Decompositions of Estimated Linear Dynamic Models, *ECMT* 1993

Runkle, D. "Vector Autoregressions and Reality," *Journal of Business and Economic Statistics* 1987, 437-54 (Also "Comments" by Blanchard, Sims and Watson)

Kilian, L. "Small Sample Confidence Intervals for Impulse Response Functions" *RESTAT* 1998, 218-230

Horowitz, J "The bootstrap" Chapter 52 in *HBECMTS*, Volume 5

Horowitz J. "Bootstrap Methods in Econometrics: Theory and Empirical Performance" presented at Econometric Society's 7th World Congress

Bradley Efron and Robert Tibshirani *An Introduction to the Bootstrap*, Chapman & Hall, 1993

Hall, P. "Methodology and Theory for the Bootstrap" in *HBECMTS* chapter 39

* Sims C. and T. Zha "Error Bands for Impulse Responses" *ECMT* 67(5), September 1999, 1113-55.

Sims C., Notes on error bands for impulse responses:

<http://sims.princeton.edu/yftp/Times16/ErrBandsIRandGCP.pdf>

Donald W. K. Andrews & Moshe Buchinsky "A Three-Step Method for Choosing the Number of Bootstrap Repetitions," *Econometrica*, 2000

Berkowitz & Kilian (2000) "Recent developments in bootstrapping time series" *Econometric Reviews*

Benkwitz, Neumann & Lütkepohl (2000) "Problems related to confidence intervals for impulse responses of autoregressive processes" *Econometric Reviews*

Hall, A. R., A. Inoue, J. M. Nason, and B. Rossi (2012) "Information criteria for impulse response function matching estimation of DSGE models," *Journal of Econometrics*

2D. VARMA Models and Methods

Helmut: 6,7,8,9

Kascha C. and Mertens K. (2008) "Business Cycle Analysis and VARMA Models" *JEDC*

Lütkepohl H. (2004) "Forecasting with VARMA Models"

Metaxoglou & Smith (2007) “Maximum likelihood estimation of VARMA models using a state-space EM algorithm” *Journal of Time Series Analysis*

Galbraith, Ullah & Zinde-Walsh (2002) “ Estimation of the VARMA model by VAR” *Econometric Reviews*

* Dufour J-M. & D. Pelletier” (2022) “Practical Methods for Modeling Weak VARMA Processes: Identification, Estimation and Specification With a Macroeconomic Application” *JBES*

Keating “Asymmetric Vector Autoregressive Moving Average Models” WP

2E. Model Selection

Ng, S., and P. Perron. "A Note on the Selection of Time Series Models." *Oxford Bulletin of Economics and Statistics* 67, no. 1 (2005): 115-134.

Leeb, H., and B. M. Pötscher. "Model Selection and Inference: Facts and Fiction." *Econometric Theory* 21 (2005): 21-59.

Leeb, H., and B. M. Pötscher. "The Finite-Sample Distribution of Post-Model-Selection Estimators and Uniform versus Nonuniform Approximations." *Econometric Theory* 19 (2003): 100-142.

Hansen, B. "Challenges for Econometric Model Selection." *Econometric Theory* 21 (2005): 60-68.

Kuersteiner, G. M. "Automatic Inference for Infinite Order Vector Autoregressions." *Econometric Theory* 21 (2005): 85-115.

2F. Local Projections

Òscar Jordà, “Estimation and Inference of Impulse Responses by Local Projections,” *AER* 2005

D. Li, M. Plagborg-Møller, and C. Wolf (2022) “Local Projections vs. VARs: Lessons From Thousands of DGPs”

Kim, Y.J. and L. Kilian (2011). “How Reliable are Local Projection Estimators of Impulse Responses?” *RESTAT* 93, 1460-1466.

Plagborg-Møller, M. and C. Wolf (2021), “Local Projections and VARs Estimate the Same Impulse Responses,” *Econometrica*.

Herbst, Edward P., and Benjamin K. Johansson (2020). “Bias in Local Projections,” *Finance and Economics Discussion Series 2020-010*. Board of Governors of the Federal Reserve System

2G. Seminal papers on SVAR (structural VAR) modeling

K&L: 4

K&L: 7.6

Bernanke, B., (1986), "Alternative Explanations of the Money-Income Correlation", Carnegie-Rochester Conference on Public Policy, 25, 49-99.

Sims, C. (1986) "Policy analysis with econometric models" Minneapolis Federal Reserve Bank, Quarterly Review

Blanchard, Olivier J. and Mark Watson. "Are All Business Cycles Alike?" in *The American Business Cycle: Continuity and Change*, R.J. Gordon. Chicago: University of Chicago Press, 1986, pp. 123-156.

J. A. Hausman and W. E. Taylor, "Identification in Linear Simultaneous Equation Models with Covariance Restrictions: An Instrumental Variables Interpretation," *Econometrica*, 51, pp. 1527-1549.

Sims C., Notes on structural VAR's: <http://sims.princeton.edu/yftp/Times16/SVAR16.pdf>

3. Determining the Effects of a Shock to Monetary Policy

* Ramey, V. (2016). "Macroeconomic Shocks and their Propagation," *Handbook of Macroeconomics*, Vol. 2A. pp. 71-162.

Sims C. (2012) "Statistical Modeling of Monetary Policy and its Effects" AER

3A. Short-Run Identifying Restrictions

K&L: 8,9

* Keating, J., Kelly, L., Smith A.L., and Valcarcel, V. (2017) "A Model of Monetary Policy Shocks for Financial Crises and Normal Conditions"

Farmer R., *The Macroeconomics of Self-Fulfilling Prophecies*, Ch 11

Bernanke B. and A. Blinder "The Federal Funds Rate and the Channels of Monetary Transmission," AER 1992, 901-21

Leeper, E and D Gordon, "In Search of the Liquidity Effect," JME 1992

* Christiano L., M. Eichenbaum and C. Evans "Monetary Policy Shocks: What Have We Learned?" Chapter 2 *Handbook of Macroeconomics Vol 1* (also NBER WP #6400)

Keating J. "Structural Information in Recursive VAR Orderings," JEDC 1996, 1557-1580

Soyoung Kim and Nouriel Roubini, Exchange rate anomalies in the industrial countries: A solution with a structural VAR approach, *Journal Of Monetary Economics* (45)3 (2000) pp. 561-586

Strongin, Steven "The Identification of Monetary Policy Disturbances: Explaining the Liquidity Puzzle" JME 1995, 463-97

Bernanke B. and I. Mihov "Measuring Monetary Policy" QJE 113(3), August 1998, pages 869-902 (also NBER WP #5145)

Cover, J."Asymmetric Effects of Positive and Negative Money-Supply Shocks" QJE 1992, 1261-82

Bagliano F. and C.Favero "Measuring Monetary Policy with VARs: An Evaluation" EER 1998, 1069-1112

Leeper E. and T. Zha (2003) "Modest Policy Interventions" *Journal of Monetary Economics*, 1673-1700

Leeper E. and T. Zha "Assessing Simple Policy Rules: A View from a Complete Macroeconomic Model" *St. Louis Fed Review*, July 2001, 83-110

Bernanke B. & I. Mihov "The Liquidity Effect and Long-run Neutrality" CRCS 49, Dec. 1998, p 149-94

Jean Boivin & Marc Giannoni "Has Monetary Policy Become More Effective?" 2006 RESTAT 445-462,

Jordi Galí, J. David López-Salido and Javier Vallés, (2003) "Technology shocks and monetary policy: Assessing the Fed's performance", AER Volume 50, Issue 4, May, Pages 723-743

Soyoung Kim, "International transmission of U.S. monetary policy shocks: Evidence from VAR's", JME, Volume 48, Issue 2,(October 2001), Pages 339-372

Andrew Ang and Monika Piazzesi, "A no-arbitrage vector autoregression of term structure dynamics with macroeconomic and latent variables", JME Volume 50, Issue 4,(May 2003) Pages 745-787

Kenneth N. Kuttner "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market", JME, Volume 47, Issue 3,(June 2001) Pages 523-544

Cecchetti, Stephen G. & Georgios Karras, "Sources of output fluctuations during the interwar period: Further evidence on the causes of the Great Depression", *Review of Economics and Statistics*, Vol.76,Issue 1, (Feb 1994), 80-102

Cochrane, John H. and Monika Piazzesi, "The Fed and Interest Rates – a High Frequency Identification" 2002 AER 92, 90-95.

Faust, Jon & Swanson, Eric T. & Wright, Jonathan H., 2004. "Identifying VARS based on high frequency futures data," *Journal of Monetary Economics*, vol. 51(6), pages 1107-1131, September.

Emi Nakamura and Jon Steinsson (2018) "High Frequency Identification of Monetary Non-Neutrality: The Information Effect"

Brissimis & Magginas (2006) "Forward-looking information in VAR models & the price puzzle" JME

3B. Searching for Structure

Swanson N. and H. White “Impulse Response Functions Based on a Causal Approach to Residual Orthogonalization in Vector Autoregressions” *Journal of the American Statistical Association*; 92(437), March 1997, pages 357-67.

Demiralp S. and K. Hoover (2003) “Searching for the Causal Structure of a Vector Autoregression” *Oxford Bulletin of Economics and Statistics*, 745-67

3C. Sign Restrictions

K&L: 13

Faust J. “The Robustness of Identified VAR Conclusions about Money” CRCS 1998 (Also Uhlig’s comments)

Uhlig H. “What are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure” *JME* 2005, 381-419.

Canova F. and G. De Nicoló (2002), “Monetary disturbances matter for business fluctuations in the G-7”, *Journal of Monetary Economics*, 49, 1131-1159.

A Inoue, L Kilian (2013) “Inference on impulse response functions in structural VAR models” *Journal of Econometrics*.

* Fry R, and Pagan A (2011) "Sign Restrictions in Structural Vector Autoregressions: A Critical Review", *Journal of Economic Literature*

C. Baumeister & J. Hamilton (2015) “Sign Restrictions, Structural Vector Autoregressions, and Useful Prior Information” *Econometrica*

Jonas E. Arias, Dario Caldara, and Juan F. Rubio-Ramirez (2015) “The Systematic Component of Monetary Policy in SVARs: An Agnostic Identification Procedure” Board of Governors of the Federal Reserve System, International Finance Discussion Paper #1131

3D. The Narrative Approach

Romer C. and D. Romer "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," *NBER Macroeconomics Annual* 1989

Romer C. and D. Romer "New evidence on the monetary transmission mechanism," *BPEA* 1990

Leeper E. “Narrative and VAR Approaches to Monetary Policy: Common Identification Problems” *JME* 1997, 641-657 (Also the response of Romer and Romer)

Boschen, J and L. Mills, "The Relation between Narrative and Money Market Indicators of Monetary Policy" *Economic Inquiry* 1995, 24-44

Shapiro, M. "Federal reserve policy: Cause and effect" Ch:9 in *Monetary Policy*, ed. G. Mankiw,

Hoover K. and S. Perez "Post Hoc Ergo Propter Hoc Once More: An Evaluation of Does Monetary Policy Matter? in the Spirit of James Tobin," *JME* 1994 (Also the response of Romer and Romer)

Beaudry P. and M.Saito "Estimating the effects of monetary shocks: An evaluation of different approaches" *JME* 1998, 241-260

* Christina D. Romer and David H. Romer, "A New Measure of Monetary Shocks: Derivation and Implications," *The American Economic Review*, Vol. 94, No. 4, September 2004

3E. Identification through Heteroskedasticity

K&L: 14

ENDERS: 3

Rigobon R. (2003) "Identification through heteroskedasticity" *RESTAT*, Vol. 85, No. 4, pp. 777-792

Lanne, M., and H. Lütkepohl (2008), "Identifying Monetary Policy Shocks via Changes in Volatility," *Journal of Money, Credit, and Banking*, 40, 1131-1149.

Enrique Sentana, Gabriele Fiorentin (2001) "Identification, estimation and testing of conditionally heteroskedastic factor models" *Journal of Econometrics* Volume 102, Issue 2, pp. 143-164

Rigobon R. (2003) "On the measurement of the international propagation of shocks: Is the transmission stable?" *Journal of International Economics*, Volume 61, Issue 2, pp. 261-283

Rigobon R. & B. Sack (2004) "The impact of monetary policy on asset prices" *Journal of Monetary Economics* Volume 51, Issue 8, pp. 1553-1575

Rigobon R. & B. Sack (2003) "Measuring the reaction of monetary policy to the stock market" *QJE*. Vol. 118, No. 2, pp. 639-669

3F. Jim Hamilton's Approach

Hamilton J. "The Daily Market for Federal Funds" *JPE* 1996, 26-56

Hamilton J. "Measuring the Liquidity Effect" *AER* 1997, 80-97

Hamilton J. "Supply and Demand for Federal Reserve Deposits" *CRC* 1998 (and UCSD WP)

Hamilton, J. & O. Jorda (2002) "A Model for the Federal Funds Rate Target" *JPE*:110, pp. 1135-1167.

Thornton, D. Identifying the Liquidity Effect at the Daily Frequency” St. Louis Fed Review, July 2001, 59-78

Carpenter, Seth & Selva Demiralp (2006) “The Liquidity Effect in the Federal Funds Market, Evidence from daily open market operations” JMCB, pp. 901-920

3G. Long-Run Identifying Restrictions

K&L: 11,12

Keating J. & T. Ghosh "Postwar US Business Cycles in Models with Long-Run Monetary Neutrality” 2017 WP

Fung B. and M.Kasumovich “Monetary Shocks in the G-6: Is There a Puzzle?” JME 1998, 575-592

* Keating J. "Structural Inference with Long-Run Recursive Empirical Models" *Macroeconomic Dynamics* 2001.

Keating J. “When do Long-Run Recursive Identification Restrictions and Wold Orderings Yield Identical Results?” 2013 WP

Muller U. (2007) “A theory of robust long-run variance estimation” JECMTS, 1331-1352

* Christiano, L. M. Eichenbaum, and R. Vigfusson (2006) “Alternative procedures for estimating VARs identified with long-run restrictions” *Journal of the European Economic Association*, 475-483.

4. Introduction to Unit Roots

ENDERS: 4

TSA: 15,16,17

HELMUT: 11

* Stock and Watson (1988) "Variable Trends in Economic Time Series," *Journal of Economic Perspectives*, 147-174

Stock J. "Unit Roots, Structural Breaks and Trends" HBECMTS chapter 46

Campbell, J. and P. Perron "Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots," *NBER Macroeconomics Annual* 1991

Beveridge S. and C. Nelson "A New Approach to Decomposition of Economic Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the Business Cycle," JME 1981, 151-174

Nelson, C. and C. Plosser "Trends and Random Walks in Macroeconomic Time Series: Some Evidence

and Implications," JME 1982, 129-162

Phillips P. and Z.Xiao "A Primer on Unit Root Testing" *Journal of Economic Surveys* 12(5), December 1998, pages 423-69. (also Yale WP)

Dickey & Fuller "Distribution of the estimators for autoregressive time series with a unit root" JASA 1979, 427-431.

Dickey, D.A. and W.A. Fuller (1981). "Likelihood ratio statistics for autoregressive time series with a unit root," *Econometrica*, 49 1057-1052.

Phillips, PCB (1987). "Time series regression with a unit root," *Econometrica* 55, 277-301.

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