

Syllabus
Applied Time Series Econometrics
Joint HSE-NES Undergraduate Program
FALL 2019

Department: Faculty of Economic Sciences

Level: Undergraduate

Course Type: Elective

Language of instruction: English

Period: Module 1, 2

Instructor: Dr. Madina Karamysheva, E-mail: mkaramysheva@hse.ru, office number S-639

Course Goals and Learning Objectives:

The objective of this course is to provide the student with tools for empirical analysis of time series and to show how econometric models can be applied to empirical models in macroeconomics and finance. We first review the basics of time series econometrics. Then, in more details, we look at the VAR class of models, including VAR, VARX, VECM, GVAR, and its rather broad application to macroeconomics, including fiscal and monetary policy and some finance applications. After that, we cover ARCH, GARCH with its application to value at risk and contagion.

Course Prerequisites

Linear Algebra, Probability Theory, Mathematical Analysis, Basic Econometrics

Course Content:

The order might change during the course

1. Introduction/reviewing of time series econometrics
 - (a) Time Series Data – Stochastic processes Stationary and Ergodic Processes
 - (b) ARs, MAs and ARMA processes
 - (c) Correlogram, forecasting, and lag length selection, Box-Jenkins approach
2. Non-stationarity: trends (deterministic and stochastic) and unit root tests: consequences, detection, remedies, breaks
3. ARIMA Processes, Trend-cycle decompositions (Beveridge-Nelson, Hodrik-Prescott)
4. Multivariate Time Series Models. VAR
 - (a) Description of VAR models (estimation, impulse responses, variance decomposition and forecasting)
 - (b) Identification of VAR

- i. From VAR innovations to structural shocks
 - ii. SVAR models: identification (short run, long run, sign restrictions)
 - iii. Structural Shocks identified independently from VAR
 - (c) Cointegration and Error Correction representation (ECM)
 - (d) GVAR
5. VAR applications
- (a) Finance. Log-linearized Models of Stock and Bond Returns
 - (b) Macro. Monetary policy
 - (c) Macro. Fiscal policy
6. Modeling the conditional variance (ARCH, GARCH, Multivariate GARCH)
- (a) GARCH application:
 - i. Value at Risk
 - ii. Contagion

Course Reading Material:

- Lecture notes/slides in pdf format
- Main TextBooks:
 - Enders, Applied Econometric Time Series, Wiley Series in Probability and Statistics (abbr. E)
- Additional TextBooks:
 - Luca Sala, Notes on Time Series Analysis. Lecture Notes (abbr. LS)
 - Stock and Watson, Introduction to Econometrics, Addison Wesley (abbr. SW)
 - Favero, Carlo A. Lecture notes: VAR models in Macro and Finance (abbr. CF1)
 - Favero, Carlo A. Applied macroeconometrics. Oxford University Press on Demand, 2001. (abbr. CF2)
 - Ambrogio Cesa-Bianchi. A Primer on Global VARs. Slides (abbr. ACB)
 - Hamilton, James, Time Series Analysis, Princeton University Press (abbr. JH) (advanced book)
- Journal articles
 - Introduction/reviewing of time series econometrics
 - * Cochrane, 1994. "Permanent and Transitory Components of GNP and Stock Prices" The Quarterly Journal of Economics, vol. 109(1), pp. 241-65.

- * Baxter & King, 1999, "Measuring Business Cycles: Approximate Band-Pass Filters For Economic Time Series" *The Review of Economics and Statistics*, vol. 81(4), pp. 575-593
- Non-stationarity
 - * Hansen, B., "The New Econometrics of Structural Change", *JEP* 2001
 - * Sims, Christopher A., James H. Stock, and Mark W. Watson. "Inference in linear time series models with some unit roots." *Econometrica: Journal of the Econometric Society* (1990): 113-144.
- VAR
 - * Blanchard and Quah, 1989. "The Dynamic Effects of Aggregate Demand and Supply Disturbances" *American Economic Review*, vol. 79(4), pp. 655-73.
 - * Garratt A., D. Robertson and S.Wright(2003) "Permanent vs Transitory Components and Economic Fundamentals", mimeo
 - * Gali, 1999, "Technology, Employment, and the Business Cycle: Do Technology Shocks Explain Aggregate Fluctuations?," *American Economic Review*, vol. 89(1), pp. 249-271.
 - * Lettau M. and S.Ludvigson(2004) Understanding Trend and Cycle in Asset Values: Reevaluating the Wealth Effect on Consumption. *American Economic Review*, 2004, March, Volume 94, No. 1, pages 276-299.
 - * Sims, 1980, "Macroeconomics and Reality", *Econometrica*, 48(1), pp. 1-48
- VAR applications. Finance. Log-linearized Models of Stock and Bond Returns
 - * Campbell J.Y. and R.J. Shiller (1987) "Cointegration and Tests of Present Value Models", *Journal of Political Economy*, 95, 5, 1062-1088
 - * Campbell J.Y. and R.J. Shiller(1988) "Interpreting Cointegrated Models" NBER W.P. 2568
- VAR applications. Linearized Present Value models for Consumption
 - * Lettau, Martin, and Sydney Ludvigson, 2001, Consumption, Aggregate Wealth and Expected Stock Returns, *Journal of Finance*, 56, 3, 815-849.
- VAR applications. Macro. Model Evaluation of a Simple DSGE Model
 - * Del Negro, Marco, and Frank Schorfheide (2004): " Priors from General equilibrium Models for VARs," *International Economic Review*, 45, 643-673.
 - * Del Negro, Marco, and Frank Schorfheide (2006): "How Good is what You've Got? DSGE-VAR as a Toolkit for evaluating DSGE Models," *Federa Reserve Bank of Atlanta Economic Review*
 - * Woodford, Michael "Interest and prices: Foundations of a theory of monetary policy." (2003), Princeton University Press
- VAR applications. Macro. Monetary policy
 - * Leeper, Eric M., Christopher A. Sims, Tao Zha, Robert E. Hall, and Ben S. Bernanke. "What does monetary policy do?." *Brookings papers on economic activity* 1996, no. 2 (1996): 1-78

- * Christiano, Lawrence J., Martin Eichenbaum, and Charles Evans. The effects of monetary policy shocks: some evidence from the flow of funds. No. w4699. National Bureau of Economic Research, 1994.
 - * Christiano, Lawrence J., Martin Eichenbaum, and Charles L. Evans. "Monetary policy shocks: What have we learned and to what end?." Handbook of macroeconomics 1 (1999): 65-148.
- VAR applications. Macro. Fiscal policy
- * Alesina A., Favero C.A. and F.Giavazzi (2015) "The Output effect of Fiscal Consolidation Plans", Journal of International Economics
 - * Auerbach, Alan, and Yuriy Gorodnichenko (2012), "Fiscal Multipliers in Recession and Expansion." (Chicago: University of Chicago Press).
 - * Blanchard, Olivier and R. Perotti [2002]: "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", Quarterly Journal of Economics
 - * Caldara D.(2011) "The Analytics of SVAR: A unified framework to measure fiscal multipliers"
 - * Favero C. and M.Karamysheva(2015) What Do We know about Fiscal Multipliers?
 - * Mertens, Karel, and Morten O Ravn. 2014. "A reconciliation of SVAR and narrative estimates of tax multipliers." Journal of Monetary Economics, 68: S1–S19.
 - * Mountford, Andrew, and Harald Uhlig. 2009. "What are the effects of Fiscal policy shocks?" Journal of Applied Econometrics, 24(6): 960–992.
 - * Ramey, Valerie A. 2016. "Macroeconomic shocks and their propagation." National Bureau of Economic Research, No. w21978.
 - * Romer, Christina D, and David H Romer. 2009. "A narrative analysis of postwar tax changes." manuscript, University of California, Berkeley.
 - * Uhlig, Harald. 2010. "Some fiscal calculus." The American Economic Review, 100(2): 30–34.
- Modeling the conditional variance (ARCH, GARCH, Multivariate GARCH)
- * Engle, Robert. "GARCH 101: The use of ARCH/GARCH models in applied econometrics." The Journal of Economic Perspectives 15, no. 4 (2001): 157-168.
 - * Favero, Carlo, and Alessandro Missale. "Sovereign spreads in the eurozone: which prospects for a Eurobond?." Economic Policy 27, no. 70 (2012): 231-273.

Grading

Grade will be based on inclass quizzes: 5%, home assignments: 15% for the regular homeworks and 20% for one big practical homework in the end of the course, midterm test 30% (only if the grade is higher than final), final test 30 % (if the grade of midterm is higher than the final grade) and 60% other wise. Midterm test is not compulsory, it works only for your benefit, if you would like to take it. There is no blocking elements in our grading system.

One might choose to substitute exam with term paper. Term paper is an individual project and should include replication of the paper plus some improvements. (For example, replicate the paper of Mertens and Ravn, 2012 + do this procedure also for both taxes and government expenditures). As a result of your work you should provide a term paper + replication files with instructions. Since term paper is a time consuming task, you are strongly recommended to make you choice before the midterm. This option does not exempt you from attending the lectures, seminars.

Please keep in mind that if a student receives a failing grade for a course, he or she gets two chances for a make-up. The first make up is usually a retake (retake is similar to the final test). This make-up is graded by the course instructor. The second make-up is graded by a committee consisting of three or more members, including the course instructor.

It is important to notice, that the formula for the course grade does not change. So if you do not take part in any assignments, quizzes and you get zero, then your maximum grade will be $0*0.05 + 0*0.15 + 0*0.2 + 0.6*(\text{grade of retake})$