

TIME SERIES ANALYSIS

NRU HSE SPb

MA Applied Economics and Mathematical Methods

Fall 2016

Syllabus

I. Course name, ECTS, quarter/semester, contact hours

Time Series Analysis, 2nd quarter, 4 ECTS, 32 Contact hours

II. Author of the course

Sergey Slobodyan, PhD, Department of Economics

III. Outline

Time series analysis is a very important component in a tool set which every applied macroeconomist should be able to use. The term time series refers to a set of repeated observations of one or several random variables, which could be ordered from having occurred earlier in time to later.

We start by covering the basic concepts in univariate linear time series analysis: Autoregressive Moving Average (ARMA) processes, basic understanding of unit root behavior, and fundamental (Wold) representation of the time series. We will spend some time on issues related to invertibility of MA representations. Turning to multivariate analysis, we will talk about unrestricted Vector Autoregressions (VARs) and Structural VARs (SVARs), mostly obtained through recursive ordering. More generally, we will discuss short-term restrictions that allow identification of VARs and interpretation of the results, such as Impulse Response Functions (IRFs) and forecast variance decompositions. An issue of cointegration and corresponding Vector Error Correction Models (VECMs) will be lightly touched upon. If time allows, we finish by discussing long-term restrictions and sign restrictions.

We will spend most of the time discussing papers that studied the effect of monetary policy shocks on the economy, using different approaches described above. If time permits, we will touch upon a recent discussion of response of hours worked to productivity shocks and other macroeconomic debated being settled using multivariate time series methodology. For practical applications, we will use tools such as JMulti and EViews.

IV. Structure and content (items with * sign denote topics which might be skipped due to lack of time).

1. Stationarity, lag operator, ARMA, and covariance structure
2. Vector Autoregressions (VAR)
 - a. Wold Decomposition Theorem
 - b. Classical VAR analysis. Recursive Identification.
 - c. Structural VARs (SVAR).
 - d. Bayesian VARs.
 - e. Local Projections.
 - f. *Sign Restrictions.
3. Effects of Monetary Policy.
 - a. Short-Run Restrictions
 - b. Narrative Approach
 - c. Miranda-Agrippino and Ricco: and integrated approach.
4. Unit Roots and Cointegration
5. Aggregate Demand and Supply, Effects of Productivity Shocks
6. *Long-Run Restrictions.

Topics	Total	Face-to-face meetings		Home work
		Lectures	Tutorials	
1. Stationarity, lag operator, ARMA, and covariance structure	34	2	8	18
2. VARs	32	4	6	16
3. Effects of Monetary Policy	28	4	6	18
4. Unit Roots and Cointegration	10	2	4	10
5. Aggregate Demand and Supply, Effects of Productivity Shocks	10	2	4	10
Total hours	114	14	28	72

V. Prerequisites

Mathematics for Economists, Econometrics.

VI. Assessment

70% - final exam, 30% - home work and class participation.

VII. Literature

Main textbook:

(SWJ) John Cochrane, Time Series for Macroeconomics and Finance,
https://faculty.chicagobooth.edu/john.cochrane/research/papers/time_series_book.pdf

Additional Textbook:

Fabio Canova, Methods for Applied Macroeconomic Research,
Princeton University Press, 2007.