

SoFiE Financial Econometrics Summer School

Big Data in Macroeconomics and Finance

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Instructors: **Domenico Giannone, Giorgio Primiceri**

Affiliation: Federal Reserve Bank of New York, Northwestern University

Email: dgiannon2@gmail.com, g-primiceri@northwestern.edu

1. GENERAL DESCRIPTION OF THE COURSE

This course is an introduction to modern time series econometrics, with an emphasis on methods designed to deal with “big data” in macroeconomics and finance. The three main subjects of the course are: (i) univariate predictive regressions with many regressors; (ii) dynamic factor models, as a first example of popular multivariate models that can handle large datasets; (iii) Bayesian VARs, as a second example of big data multivariate models, which also represent a bridge between reduced-form and structural models. We will also touch upon several other topics, such as state-space models, Monte Carlo methods, model comparison and model choice. Along the way, we will discuss applications to nowcasting and forecasting in macroeconomics and finance, portfolio selection, term structure models, scenario analysis, monetary policy transmission, long horizon forecasts.

2. PLAN OF THE COURSE: **DAY 1**

Lecture 1: Big data and the curse of dimensionality in macroeconomics and finance: Symphoms and cures.

Lecture 2: Principal components, ridge and lasso regressions, and other regularization techniques.

Some references for day 1: Hoerl and Kennard (1970); Leamer (1973); Tibshirani (1996); Hastie et al. (2001); Stock and Watson (2002a,b); De Mol et al. (2008); Belloni et al. (2011); Hastie et al. (2015); Ludvigson and Ng (2009); Brodie et al. (2009); Kozak et al. (2017); Freyberger et al. (2017).

3. PLAN OF THE COURSE: **DAY 2**

Lecture 3: Multivariate models: Dynamic factor models and their connection with principal components.

Some references for day 2: Lawley and Maxwell (1963); Bai and Ng (2008); Stock and Watson (2016); Diebold and Rudebusch (2012); Coroneo et al. (2016); Bok et al. (2017).

4. PLAN OF THE COURSE: **DAY 3**

Lecture 4: A brief introduction to Bayesian inference.

Lecture 5: Priors and their connection with regularization techniques.

Some references for day 3: Gelman et al. (2004); Geweke (2005); Park and Casella (2008).

5. PLAN OF THE COURSE: **DAY 4**

Lecture 6: Selection of regularization parameter/prior tightness: Model comparison and model choice.

Lecture 7 : Multivariate models: VARs and Bayesian VARs.

Some references for day 4: Gelman et al. (2004); Geweke (2005); Hamilton (1994); Doan et al. (1984); Sims and Zha (1998); Banbura et al. (2010); Del Negro and Schorfheide (2011); Karlsson (2013); Giannone et al. (2015).

6. PLAN OF THE COURSE: **DAY 5**

Lecture 8: Unconditional, conditional forecasts and scenario analysis.

Lecture 9: Presentation of “Economic Predictions with Big Data: The Illusion of Sparsity.”

Some references for day 5: Banbura et al. (2015); Johannsen and Mertens (2016); Wu and Xia (2016); Giannone et al. (2017).

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