

# PhD Econometrics II

## Spring 2025

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### Exams, Practice Problems, and Assessment

Your grade for my half of the semester will be based on a midterm exam, the date of which is still TBD. The exam will be closed book, and no notes or electronic devices will be allowed.

I'll also post practice problems from time to time. These are optional and won't be graded, but working on them will deepen your understanding of the material and help you prepare for the midterm exam. Many of them are actually old exam questions. Solutions will be discussed during recitation.

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### Textbooks and Other Readings

My lecture slides will be posted on the course web page.

The main textbook is *Time Series Analysis* by James Hamilton. Students seeking a more introductory treatment might prefer *Time Series Models* by Andrew Harvey. *TSM* is out of print, but used copies can be found online.

Required readings are marked with an asterisk. Links to journal articles can be found below.

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### Topics

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## Time Domain Representations

Ensembles. Stationarity and mixing conditions. The Wold representation. ARMA processes. Invertibility. Vector processes.

\*Hamilton, chs. 2-3, 10.1-10.3.

Harvey, ch. 2.

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## Maximum Likelihood Estimation

The MLE concept. The prediction-error decomposition. State-space representations and the Kalman filter. Consistency and asymptotic normality. Trio of tests.

\*Hamilton, chs. 5, 7, and 13.

Harvey, chs. 4-5.

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## Applications of MLE

### Reduced form vector autoregressions

ML estimation. Forecasting and Granger causation. Stochastic trends. Testing cross-equation restrictions. Variance decompositions.

\*Hamilton, ch. 11.

[Campbell and Shiller, 1987, Cointegration and Tests of Present-Value Models](#)

[Cochrane, 1991, Explaining the variance of price-dividend ratios](#)

[Cochrane, 1994, Permanent and transitory components of GNP and Stock Prices](#)

[Rotemberg and Woodford, 1996, Real-Business-Cycle Models and Forecastable Movements in Output, Hours, and Consumption](#)

[Cochrane, 2022, The Fiscal Roots of Inflation](#)

### DSGE models

ML estimation. An introduction to Bayesian estimation.

\*Hamilton, ch. 12.

## Identified VARs

[Blanchard and Quah, 1989, Dynamic Effects of Aggregate Supply and Demand Shocks](#)

[Cogley and Nason, 1995, Output Dynamics in Real-Business-Cycle Models](#)

[Kehoe, 2006, How to Advance Theory with Structural VARs](#)

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## Introduction to unit roots and cointegration

Priors and tests. Near observational equivalence. Beveridge-Nelson representation. Granger's representation theorem. Balanced growth implies cointegration.

\*Hamilton, chs. 15, 17, 19, 20

[Nelson and Plosser, 1982, Trends and Random Walks in Macroeconomic Time Series](#)

[Stock, 1991, Confidence Intervals for the Largest Autoregressive Root in US Macroeconomic Time Series](#)

[King, Plosser, Stock, and Watson, 1991, Stochastic trends and economic fluctuations](#)

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## Generalized Method of Moments

Full v. limited information strategies for estimation. Conditional moment restrictions. Nonlinear instrumental variables estimation. Asymptotic theory. Testing overidentifying restrictions. Alternative weighting matrices.

\*Hamilton, ch. 14.

\*[Hansen and Singleton 1982, Generalized instrumental variables estimation of nonlinear rational expectations models](#)

\*[Hansen, 1982, Large Sample Properties of Generalized Method of Moments Estimators](#)

[Hansen, Unpublished Proofs for "Large Sample Properties of Generalized Method of Moments Estimators"](#)

[Hansen and Jagannathan, 1997, Assessing specification errors in stochastic discount factor models](#)

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## Introduction to Frequency Domain Analysis (time permitting)

The Cramer representation. The spectral density matrix. Linear time-invariant filters. Estimation. The long-run variance for GMM.

\*Hamilton, chs. 6, 10.4-10.5.

Harvey, ch. 3.

[Baxter and King, 1999, Measuring Business Cycles: Approximate Bandpass Filters for Economic Time Series](#)

[Cogley, 2006, Data Filters](#)

[Hamilton, 2018, Why You Should Never Use the Hodrick-Prescott Filter](#)