UNIVERSITY OF LONDON

Course information 2023-24
FN2208 Financial data analysis

General information

MODULE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

This course is an introduction to econometrics focusing on techniques applied to empirical investigations in economics and finance. The course includes a selection of the following topics: multivariate regression analysis; hypothesis testing; omitted variables and misspecification; and time-series modelling and forecasting. Students are introduced to recent empirical findings based on finance models, such as predictability of asset returns and econometric analyses of the CAPM and multifactor models.

Conditions

Pre-requisites: If taken as part of a BSc degree, the following course(s) must be passed before this course may be attempted.

- ST104a Statistics 1 (half course) **and** MT105a Mathematics 1 (half course); **or**

- MT1186 Mathematical methods; **or**

- MT1174 Calculus.

Aims and objectives

- To provide an understanding of econometrics as a concept and as an important set of tools for answering questions in economics and finance.

- To explain how to use regression analysis for answering questions regarding relationship of economic and finance variables.

- To identify, explain, and apply the appropriate econometric framework for testing economic and finance theories.

- To provide an understanding of the limitations of different techniques and develop an understanding of possible solutions.

- To develop a foundation for further studies in econometrics.

Reading

Detailed reading lists are distributed at the start of the course.

Essential reading:

- Introduction to Econometrics by James Stock and Mark Watson, Pearson, 4th edition.

Optional reading:

- Wooldridge, Introductory Econometrics: A Modern Approach, 7th edition.
- Chris Brooks, Introductory Econometrics for Finance, 4th Edition.

Learning outcomes

By the end of the course, successful students will be able to:

- Estimate single and multiple linear regressions models using the ordinary least squares (OLS) estimator.
- Outline and critically assess the assumptions and limitation of the OLS estimator.
- Evaluate the regression results and conduct hypothesis testing.
- Estimate panel data models and perform statistical inference on these models.
- Identify and control for omitted variable biases and endogeneity.
- Identify the need for instrumental variables (IV) estimation methods, apply the two-stage least squares estimator, and test for endogeneity and valid instruments.
- Formulate and implement causal inference using experimental or quasi-experimental data.
- Apply regression techniques to time series data.
- Formulate and apply univariate and multivariate time series models to perform causal inference.
- Formulate and estimate univariate and multivariate time series models for forecasting.
- Identify and estimate stationary time series models.
- Test for unit roots.
- Test for cointegration and estimate error correction models.
- Explain, formulate, and estimate the main volatility models.

Assessment

- This course is assessed by a three-hour and fifteen-minute closed-book written examination.

Syllabus

- Introduction to Econometrics: Definitions, causality, prediction, datasets
- Single Linear Regression Model: Assumptions, analyses of fit, sampling distribution of estimator, testing hypotheses, confidence interval
- Multiple Linear Regression Model: Omitted variable bias, assumptions, control variables, analyses of fit, heteroskedasticity, finite sample properties, foundations of asymptotic theory
- Inference for Multiple Regression Model: Single and multiple coefficients, joint hypotheses, confidence set
- Nonlinear Regression Functions: Polynomials, logarithms, interaction (dummy and continuous variables)
- Violations of the OLS Assumptions: Omitted variable bias, misspecification of the functional form, measurement error bias, sample selection bias, simultaneous causality bias.
- Panel Data: Model and estimation, fixed effect, time fixed effects, assumptions.
- Instrumental Variables: Motivation, the method, estimation, sampling distribution of TSLS, the general IV model, validity of instruments (relevance, exogeneity)
- Regression Framework for Experiments and Quasi-Experiments: Experiments – estimation and threats; Quasi- Experiments - estimation and threats, heterogenous population.
- Time Series Models: Time series foundation, AR, MA, ARMA, ADL models – properties, estimation, and forecast (multi-period forecast), model specification and selection. Unit roots tests (DF and ADF), determinist and stochastic trends, spurious regression, breaks.
- Dynamic Causal Effect: The distributed Lag model, forms of exogeneity, exogenous regressors, strictly exogenous regressors, estimation, inference.
- Volatility Models: ARCH, GARCH, Realized volatility
- Vector Autoregressive Models: Inference, model selection, forecast
- Cointegration: The error correction model, testing for cointegration.