The Econometrics Of Panel Data Fundamentals And Recent Developments In Theory And Practice Advanced Studies In Theoretical And Applied Econometrics

This monograph deals with spatially dependent nonstationary time series in a way accessible to both time series econometricians wanting to understand spatial econometrics, and spatial econometricians lacking a grounding in time series analysis. After charting key concepts in both time series and spatial econometrics, the book discusses how the spatial connectivity matrix can be estimated using spatial panel data instead of assuming it to be exogenously fixed. This is followed by a discussion of spatial nonstationarity in spatial cross-section data, and a full exposition of non-stationarity in both single and multi-equation contexts, including the estimation and simulation of spatial vector autoregression (VAR) models and spatial error correction (ECM) models. The book reviews the literature on panel unit root tests and panel cointegration tests for spatially independent data, and for data that are strongly spatially dependent. It provides for the first time critical values for panel unit root tests and panel cointegration tests when the spatial panel data are weakly or spatially dependent. The volume concludes with a discussion of incorporating strong and weak spatial dependence in non-stationary panel data models. All discussions are accompanied by empirical testing based on a spatial panel data of house prices in Israel.

?This book provides an overview of three generations of spatial econometric models: models based on cross-sectional data, static models based on spatial panels and dynamic spatial panel data models. The book not only presents different model specifications and their corresponding estimators, but also critically discusses the purposes for which these models can be used and how their results should be interpreted.

This book presents the econometric foundations and applications of multi-dimensional panels, including modern methods of big data analysis. The last two decades or so, the use of panel data has become a standard in many areas of economic analysis. The available models formulations became more complex, the estimation and hypothesis testing methods more sophisticated. The interaction between economics and econometrics resulted in a huge publication output, deepening and widening immensely our knowledge and understanding in both. The traditional panel data, by nature, are two-dimensional. Lately, however, as part of the big data revolution, there has been a rapid emergence of three, four and even higher dimensional panel data sets. These have started to be used to study the flow of goods, capital, and services, but also some other economic phenomena that can be better understood in higher dimensions. Oddly, applications rushed ahead of theory in this field. This book is aimed at filling this widening gap. The first theoretical part of the volume is providing the econometric foundations to deal with these new high-dimensional panel data sets. It not only synthesizes our current knowledge, but mostly, presents new research results. The second empirical part of the book provides insight into the most relevant applications in this area. These chapters are a mixture of surveys and new results, always focusing on the econometric problems and feasible solutions.

This new edition of this established textbook reflects the rapid developments in the field covering the vast research that has been conducted on panel data since its initial publication. The book is packed with the most recent empirical examples from panel data literature, for example, a simultaneous equation on Crime will be added to chapter 7, which will be illustrated with STATA. Data sets will be provided as well as the programs to implement the estimation and testing procedures described in the book on the web site. Additional exercises will be added to each chapter and their solutions will be provided on the web site. The text has also been fully updated with new material on dynamic panel data models and recent results on non-linear panel models and in particular work on limited dependent variables panel data models.

This volume is dedicated to two recent intensive areas of research in the econometrics of panel data, namely nonstationary panels and dynamic panels. It includes a comprehensive survey of the nonstationary panel literature including panel unit root tests, spurious panel regressions and panel cointegration tests. In addition, it provides recent developments in the estimation of dynamic panel data models using generalized method of moments. The volume includes eleven chapters written by twenty authors. These chapters (i) investigate better methods of estimating dynamic panels; (ii) develop methods for estimating and testing hypotheses for cointegrating vectors in dynamic panels; (iii) extend the concept of serial correlation common features analysis to nonstationary panel data models; (iv) study the local power of panel unit root test statistics; (v) derive the asymptotic distributions of various estimators for the panel cointegrated regression model; (vi) propose a unit root test in the presence of structural change; (vii) develop a new limit theory for panel data that may be cross-sectionally heterogeneous; (viii) propose stationarity tests for a heterogeneous panel data model; (ix) derive instrumental variable estimators for a semiparametric partially linear dynamic panel data model; and (x) conduct Monte Carlo experiments to study the small sample properties of a growth convergence equation. This collection of papers should prove useful for practitioners and researchers working with panel data.

Many economic and social surveys are designed as panel studies, which provide important data for describing social changes and testing causal relations between social phenomena. This textbook shows how to manage, describe, and model these kinds of data. It presents models for continuous and categorical dependent variables, focusing either on the level of these variables at different points in time or on their change over time. It covers fixed and random effects models, models for change scores and event history models. All statistical methods are explained in an application-centered style using research examples from scholarly journals, which can be replicated by the reader through data provided on the accompanying website. As all models are compared to each other, it provides valuable assistance with choosing the right model in applied research. The textbook is directed at master and doctoral students as well as applied researchers in the social sciences, psychology, business administration and economics. Readers should be familiar with linear regression and have a good understanding of ordinary least squares estimation. ?

Panel data econometrics has evolved rapidly over the past three decades. The field is of both theoretical and practical importance, and methods to deal with micro- and macroeconomic panel data are in high demand from practitioners. Applications in finance, development, trade, marketing, health, labor, and consumer economics attest to the usefulness of these methods in applied economics. THis book is a comprehensive source on panel data. It contains 20 chapters edited by Professor Badi Baltagi--one of the leading econometricians in the area of panel data econometrics--and authored by renowned experts in the field. The chapters are divided into two sections. Part I examines new developments in theory. It includes panel cointegration, dynamic panel data models, incidental parameters and dynamic panel modeling, and panel data models for discrete choice. The chapters in Part II target applications of panel data, including health, labor, marketing, trade, productivity and macro applications in panels.

Panel Data Econometrics with R provides a tutorial for using R in the field of panel data econometrics. Illustrated throughout with examples in econometrics, political science, agriculture and epidemiology, this book presents classic methodology and applications as well as more advanced topics and recent developments in this field including error component models, spatial panels and dynamic models. They have developed the software programming in R and host replicable material on the book's accompanying website.

1 Introduction 5 1.1 Panel data econometrics: a gentle introduction 5 1.1.1 Eliminating unobserved components 6 1.2 R for econometric computing 11 1.2.1 The modus operandi

of R 12 1.2.2 Data management 13 1.3 plm for the casual R user 14 1.3.1 R for the matrix language user 14 1.3.2 R for the user of econometric packages 16 1.4 plm for the procient R user 18 1.4.1 Reproducibile econometric work 18 1.4.2 Object-orientation for the user 19 1.5 plm for the R developer 20 1.5.1 Object orientation for development 21 1.6 Notations 24 2 The error component model 31 2.1 Notations and hypotheses 31 2.1.1 Notations 31 2.1.2 Some useful transformations 32 2.1.3 Hypotheses concerning the errors 34 2.2 Ordinary least squares estimators 36 2.2.1 Ordinary least squares on the raw data: the pooling model 36 2.2.2 The between estimator 38 2.2.3 The within estimator 39 2.3 The generalized least squares estimator 44 2.3.1 Presentation of the gls estimator 44 2.3.2 Estimation of the variances of the components of the error 46 2.4 Comparison of the estimators 51 2.4.1 Relations between the estimators 51 2.4.2 Comparison of the variances 52 2.4.3 Fixed vs random eects 53 2.4.4 Some simple linear model examples 55 2.5 The two-ways error components model 60 2.5.1 Error components in the two-ways model 60 2.5.2 Fixed and random eects models 61 2.6 Estimation of a wage equation 62 3 Advanced error components models 67 3.1 Unbalanced panels 67 3.1.1 Individual eects model 67 3.1.2 Two-ways error component model 69 3.1.3 Estimation of the components of the error variance 73 3.2 Seemingly unrelated regression equations 80 3.2.1 Introduction 80 3.2.2 Constrained least squares 81 3.2.3 Inter-equations correlation 82 3.2.4 SUR with panel data 83 3.3 The maximum likelihood estimator 88 3.3.1 Derivation of the likelihood function 89 3.3.2 Computation of the estimator 90 3.4 The nested error components model 92 3.4.1 Presentation of the model 92 3.4.2 Estimation of the variance of the error components 93 4 Tests on error component models 101 4.1 Tests on individual and/of time eects 102 4.1.1 F tests 102 4.1.2 Breusch-Pagan tests 102 4.2 Tests for correlated eects 107 4.2.1 The Mundlak approach 108 4.2.2 Hausman's test 109 4.2.3 Chamberlain's approach 110 4.3 Tests for serial correlation 115 4.3.1 Unobserved eects test 116 4.3.2 Score test of serial correlation and/or individual eects 117 4.3.3 Likelihood Ratio tests for ar(1) and individual eects 120 4.3.4 Applying traditional serial correlation tests to panel data 122 4.3.5 Wald tests for serial correlation 124 4.4 Tests for cross-sectional dependence 126 4.4.1 Pairwise correlation coe-cients 126 4.4.2 cd -type tests for cross-sectional dependence 127 4.4.3 Testing cross-sectional dependence in a pseries 129 5 Robust inference and estimation 133 5.1 Robust inference 133 5.1.1 Robust covariance estimators 134 5.1.2 plm and generic sandwich estimators 145 5.1.3 Robust testing of linear hypotheses 150 5.2 Unrestricted generalized least squares 154 5.2.1 General feasible generalized least squares 155 5.2.2 Applied examples 160 6 Endogeneity 167 6.1 Introduction 167 6.2 The instrumental variables estimator 168 6.2.1 Generalities about the instrumental variables estimator 168 6.2.2 The within instrumental variables estimator 170 6.3 Error components instrumental variables estimator 173 6.3.1 The general model 173 6.3.2 Special cases of the general model 176 6.4 Estimation of a system of equations 186 6.4.1 The three stage least squares estimator 186 6.4.2 The error components three stage least squares estimator 188 6.5 More empirical examples 191 7 Estimation of a dynamic model 193 7.1 Dynamic model and endogeneity 195 7.1.1 The bias of the ols estimator 195 7.1.2 The within estimator 197 7.1.3 Consistent estimation methods for dynamic models 198 7.2 gmm estimation of the dierenced model 201 7.2.1 Instrumental variables

An introduction to foundations and applications for quantitatively oriented graduate social-science students and individual researchers.

Panel Data EconometricsTheoryAcademic Press

This is the essential companion to the second edition of Jeffrey Wooldridge's widely used graduate econometrics text. The text provides an intuitive but rigorous treatment of two state-of-the-art methods used in contemporary microeconomic research. The numerous end-of-chapter exercises are an important component of the book, encouraging the student to use and extend the analytic methods presented in the book. This manual contains advice for answering selected problems, new examples, and supplementary materials designed by the author, which work together to enhance the benefits of the text. Users of the textbook will find the manual a necessary adjunct to the book.

The second edition of a comprehensive state-of-the-art graduate level text on microeconometric methods, substantially revised and updated. The second edition of this acclaimed graduate text provides a unified treatment of two methods used in contemporary econometric research, cross section and data panel methods. By focusing on assumptions that can be given behavioral content, the book maintains an appropriate level of rigor while emphasizing intuitive thinking. The analysis covers both linear and nonlinear models, including models with dynamics and/or individual heterogeneity. In addition to general estimation frameworks (particular methods of moments and maximum likelihood), specific linear and nonlinear methods are covered in detail, including probit and logit models and their multivariate, Tobit models, models for count data, censored and missing data schemes, causal (or treatment) effects, and duration analysis. Econometric Analysis of Cross Section and Panel Data was the first graduate econometrics text to focus on microeconomic data structures, allowing assumptions to be separated into population and sampling assumptions. This second edition has been substantially updated and revised. Improvements include a broader class of models for missing data problems; more detailed treatment of cluster problems, an important topic for empirical researchers; expanded discussion of "generalized instrumental variables" (GIV) estimation; new coverage (based on the author's own recent research) of inverse probability weighting; a more complete framework for estimating treatment effects with panel data, and a firmly established link between econometric approaches to nonlinear panel data and the "generalized estimating equation" literature popular in statistics and other fields. New attention is given to explaining when particular econometric methods can be applied; the goal is not only to tell readers what does work, but why certain "obvious" procedures do not. The numerous included exercises, both theoretical and computer-based, allow the reader to extend methods covered in the text and discover new insights.

Financial data are typically characterised by a time-series dimension and a cross-sectional dimension. For example, we may observe financial information on a group of firms over a number of years, or we may observe returns of all stocks traded at NYSE over a period of 120 months. Accordingly, econometric modelling in finance requires appropriate

attention to these two -- or occasionally more than two -- dimensions of the data. Panel data techniques are developed to do exactly this. This book provides an overview of commonly applied panel methods for financial applications. The use of panel data has many advantages, in terms of the flexibility of econometric modeling and the ability to control for unobserved heterogeneity. It also involves a number of econometric issues that require specific attention. This includes cross-sectional dependence, robust and clustered standard errors, parameter heterogeneity, fixed effects, dynamic models with a short time dimension, instrumental variables, differences-in-differences and other approaches for causal inference. After an introductory chapter reviewing the classical linear regression model with particular attention to its use in a panel data context, including several standard estimators (pooled OLS, Fama-MacBeth, random effects, first-differences, fixed effects), the book continues with a more elaborate treatment of fixed effects approaches. While first-differencing and fixed effects estimators are attractive because of their removal of time-invariant unobserved heterogeneity (e.g. manager quality, firm culture), consistency of such estimators imposes strict exogeneity of the explanatory variables (for a finite number of time periods). This is often violated in practice, for example, some explanatory variable explaining firm performance may be partly determined by historical firm performance. An obvious case where this assumption is violated arises when the model contains a lagged dependent variable. A separate chapter will focus on dynamic models, which have received specific attention in the literature, also in the context of financial applications, like the dynamics of capital structure choices. Estimation mostly relies on instrumental variables or GMM techniques. Identification and estimation of such models is often fragile, and the small sample properties may be disappointing. The book continues with a chapter on models with limited dependent variables, including binary response models. The cross-sectional dependence that is likely to be present complicates estimation, and the author discusses pooled estimation, random effects and fixed effects approaches, including the possibility to include lagged dependent variables. This chapter will also discuss problems of attrition and sample selection bias, as well as unbalanced panels in general. Identifying causal effects in empirical work based on non-experimental data is often challenging, and causal inference has received substantial attention in the recent literature. The availability of panel data plays an important role in many approaches. Starting with simple differences-in-differences approaches, a dedicated chapter discusses instrumental variables estimators, matching and propensity scores, regression discontinuity and related approaches.

This restructured, updated Third Edition provides a general overview of the econometrics of panel data, from both theoretical and applied viewpoints.

This restructured, updated Third Edition provides a general overview of the econometrics of panel data, from both theoretical and applied viewpoints. Readers discover how econometric tools are used to study organizational and household behaviors as well as other macroeconomic phenomena such as economic growth. The book contains sixteen entirely new chapters; all other chapters have been revised to account for recent developments. With contributions from well known specialists in the field, this handbook is a standard reference for all those involved in the use of panel data in econometrics.

The data panels are a special type of samples in which the behavior of a certain number of economic agents is followed over time. In this way, the researcher can perform economic analysis and specify models with the data of cross section that are obtained when all operators are considered in an instant of time. Different patterns of behaviour of all agents together studied in the different temporal moments may thus be assessed. Alternatively, you can perform the same analysis considering time series given by the evolution of each economic agent throughout all the periods of the sample. This book explores the panel data econometrics through STATA. The most important topics are the following: Linear regression estimators in panel data models, fixed and random effects, heteroskedasticity and autocorrelation in panel data models, instrumental variables and two stage least squares in panel data models, dynamic panel data models, logit and probit panel data models, censored panel data models, count panel data models, Tobit panel data models, Poisson panel data models, negative binomial panel data models and others models with panel data.

Disk contains: Four data sets -- Ten GAUSS programs for empirical examples in text.

'Econometric Analysis of Panel Data' has become established as the leading textbook for postgraduate courses in panel data. This book is intended as a companion to the main text. The prerequisites include a good background in mathematical statistics and econometrics. The companion guide will add value to the existing textbooks on panel data by solving exercises in a logical and pedagogical manner, helping the reader understand, learn and teach panel data. These exercises are based upon those in Baltagi (2008) and are complementary to that text even though they are stand alone material and the reader can learn the basic material as they go through these exercises. The exercises in this book start by providing some background material on partitioned regressions and the Frisch-Waugh-Lovell theorem, showing the reader some applications of this material that are useful in practice. Then it goes through the basic material on fixed and random effects models in a one-way and two-way error components models, following the same outline as in Baltagi (2008). The book also provides some empirical illustrations and examples using Stata and EViews that the reader can replicate. The data sets are available on the Wiley web site (www.wileyeurope.com/college/baltagi).

In the last 20 years, econometric theory on panel data has developed rapidly, particularly for analyzing common behaviors among individuals over time. Meanwhile, the statistical methods employed by applied researchers have not kept up-to-date. This book attempts to fill in this gap by teaching researchers how to use the latest panel estimation methods correctly. Almost all applied economics articles use panel data or panel regressions. However, many empirical results from typical panel data analyses are not correctly executed. This book aims to help applied researchers to run panel regressions correctly and avoid common mistakes. The book explains how to model cross-sectional dependence, how to estimate a few key common variables, and how to identify them. It also provides guidance on how to separate out the long-run relationship and common dynamic and

idiosyncratic dynamic relationships from a set of panel data. Aimed at applied researchers who want to learn about panel data econometrics by running statistical software, this book provides clear guidance and is supported by a full range of online teaching and learning materials. It includes practice sections on MATLAB, STATA, and GAUSS throughout, along with short and simple econometric theories on basic panel regressions for those who are unfamiliar with econometric theory on traditional panel regressions.

The aim of this volume is to provide a general overview of the econometrics of panel data, both from a theoretical and from an applied viewpoint. Since the pioneering papers by Edwin Kuh (1959), Yair Mundlak (1961), Irving Hoch (1962), and Pietro Balestra and Marc Nerlove (1966), the pooling of cross sections and time series data has become an increasingly popular way of quantifying economic relationships. Each series provides information lacking in the other, so a combination of both leads to more accurate and reliable results than would be achievable by one type of series alone. Over the last 30 years much work has been done: investigation of the properties of the applied estimators and test statistics, analysis of dynamic models and the effects of eventual measurement errors, etc. These are just some of the problems addressed by this work. In addition, some specific diffi culties associated with the use of panel data, such as attrition, heterogeneity, selectivity bias, pseudo panels etc., have also been explored. The first objective of this book, which takes up Parts I and II, is to give as complete and up-to-date a presentation of these theoretical developments as possible. Part I is concerned with classical linear models and their extensions; Part II deals with nonlinear models and related issues: logit and pro bit models, latent variable models, duration and count data models, incomplete panels and selectivity bias, point processes, and simulation techniques.

This book provides a comprehensive, coherent, and intuitive review of panel data methodologies that are useful for empirical analysis. Substantially revised from the second edition, it includes two new chapters on modeling cross-sectionally dependent data and dynamic systems of equations. Some of the more complicated concepts have been further streamlined. Other new material includes correlated random coefficient models, pseudo-panels, duration and count data models, quantile analysis, and alternative approaches for controlling the impact of unobserved heterogeneity in nonlinear panel data models.

This book introduces econometric analysis of cross section, time series and panel data with the application of statistical software. It serves as a basic text for those who wish to learn and apply econometric analysis in empirical research. The level of presentation is as simple as possible to make it useful for undergraduates as well as graduate students. It contains several examples with real data and Stata programmes and interpretation of the results. While discussing the statistical tools needed to understand empirical economic research, the book attempts to provide a balance between theory and applied research. Various concepts and techniques of econometric analysis are supported by carefully developed examples with the use of statistical software package, Stata 15.1, and assumes that the reader is somewhat familiar with the Strata software. The topics covered in this book are divided into four parts. Part I discusses introductory econometric methods for data analysis that economists and other social scientists use to estimate the economic and social relationships, and to test hypotheses about them, using real-world data. There are five chapters in this part covering the data management issues, details of linear regression models, the related problems due to violation of the classical assumptions. Part II discusses some advanced topics used frequently in empirical research with cross section data. In its three chapters, this part includes some specific problems of regression analysis. Part III deals with time series econometric analysis. It covers intensively both the univariate and multivariate time series econometric models and their applications with software programming in six chapters. Part IV takes care of panel data analysis in four chapters. Different aspects of fixed effects and random effects are discussed here. Panel data analysis has been extended by taking dynamic panel data models which are most suitable for macroeconomic research. The book is invaluable for students and researchers of social sciences, business, management, operations research, engineering, and applied mathematics.

This volume includes some of the papers presented at the 11th International Conference on Panel Data, Texas, June 2004, and other solicited papers that passed the refereeing process and includes such topics as dynamic panel data estimation, non-linear panel data methods and the phenomenal growth in non-stationary panel data econometrics.

Panel data is a data type increasingly used in research in economics, social sciences, and medicine. Its primary characteristic is that the data variation goes jointly over space (across individuals, firms, countries, etc.) and time (over years, months, etc.). Panel data allow examination of problems that cannot be handled by cross-section data or time-series data. Panel data analysis is a core field in modern econometrics and multivariate statistics, and studies based on such data occupy a growing part of the field in many other disciplines. The book is intended as a text for master and advanced undergraduate courses. It may also be useful for PhD-students writing theses in empirical and applied economics and readers conducting empirical work on their own. The book attempts to take the reader gradually from simple models and methods in scalar (simple vector) notation to more complex models in matrix notation. A distinctive feature is that more attention is given to unbalanced panel data, the measurement error problem, random coefficient approaches, the interface between panel data and aggregation, and the interface between unbalanced panels and truncated and censored data sets. The 12 chapters are intended to be largely self-contained, although there is also natural progression. Most of the chapters contain commented examples based on genuine data, mainly taken from panel data applications to economics. Although the book, inter alia, through its use of examples, is aimed primarily at students of economics and econometrics, it may also be useful for readers in social sciences, psychology, and medicine, provided they have a sufficient background in statistics, notably basic regression analysis and elementary linear algebra.

Seven previously published, classic essays, and a cogent new essay on the history of the subject.

A number of advances have taken place in panel data analysis during the pastthree decades and it continues to be one of the most active areas of research. This volume contains 13 significant contributions focusing on modelling strategies, data issues, theoretical analysis and applications. Applied econometrics papers on the economics of labor, health, telecommunications, finance and macroeconomics are provided as well as a survey of recent theoretical developments in panal data analysis. Contributors include both well known scholars and younger researchers from Australia, Canada, Europe and the United States of America.

This book is concerned with recent developments in time series and panel data techniques for the analysis of macroeconomic and financial data. It provides a rigorous, nevertheless user-friendly, account of the time series techniques dealing with univariate and multivariate time series models, as well as panel data models. It is distinct from other time series texts in the sense that it also covers panel data models and attempts at a more coherent integration of time series, multivariate analysis, and panel data models. It builds on the author's extensive research in the areas of time series and panel data analysis and covers a wide variety of topics in one volume. Different parts of the book can be used as teaching material for a variety of courses in econometrics. It can also be used as reference manual. It begins with an overview of basic econometric and statistical techniques, and provides an account of stochastic processes, univariate and multivariate time series, tests for unit roots, cointegration, impulse response analysis, autoregressive conditional heteroskedasticity models, simultaneous equation models, vector autoregressions, causality, forecasting, multivariate volatility models, panel data models, aggregation and global vector autoregressive models (GVAR). The techniques are illustrated using Microfit 5 (Pesaran and Pesaran, 2009, OUP) with applications to real output, inflation, interest rates, exchange rates, and stock prices.

This timely, thoughtful book provides a clear introduction to using panel data in research. It describes the different types of panel datasets commonly used for empirical analysis, and how to use them for cross sectional, panel, and event history analysis. Longhi and Nandi then guide the reader through the data management and estimation process, including the interpretation of the results and the preparation of the final output tables. Using existing data sets and structured as hands-on exercises, each chapter engages with practical issues associated with using data in research. These include: Data cleaning Data preparation Computation of descriptive statistics Using sample weights Choosing and implementing the right estimator Interpreting results Preparing final output tables Graphical representation Written by experienced authors this exciting textbook provides the practical tools needed to use panel data in research.

R is a language and environment for data analysis and graphics. It may be considered an implementation of S, an award-winning language initially - veloped at Bell Laboratories since the late 1970s. The R project was initiated by Robert Gentleman and Ross Ihaka at the University of Auckland, New Zealand, in the early 1990s, and has been developed by an international team since mid-1997. Historically, econometricians have favored other computing environments, some of which have fallen by the wayside, and also a variety of packages with canned routines. We believe that R has great potential in econometrics, both for research and for teaching. There are at least three reasons for this: (1) R is mostly platform independent and runs on Microsoft Windows, the Mac family of operating systems, and various ?avors of Unix/Linux, and also on some more exotic platforms. (2) R is free software that can be downloaded and installed at no cost from a family of mirror sites around the globe, the Comprehensive R Archive Network (CRAN); hence students can easily install it on their own machines. (3) R is open-source software, so that the full source code is available and can be inspected to understand what it really does, learn from it, and modify and extend it. We also like to think that platform independence and the open-source philosophy make R an ideal environment for reproducible econometric research.

Written by one of the world's leading experts on dynamic panel data reviews, this volume reviews most of the important topics in the subject. It deals with static models, dynamic models, discrete choice and related models.

Panel Data Econometrics: Empirical Applications introduces econometric modelling. Written by experts from diverse disciplines, the volume uses longitudinal datasets to illuminate applications for a variety of fields, such as banking, financial markets, tourism and transportation, auctions, and experimental economics. Contributors emphasize techniques and applications, and they accompany their explanations with case studies, empirical exercises and supplementary code in R. They also address panel data analysis in the context of productivity and efficiency analysis, where some of the most interesting applications and advancements have recently been made. Provides a vast array of empirical applications useful to practitioners from different application environments Accompanied by extensive case studies and empirical exercises Includes empirical chapters accompanied by supplementary code in R, helping researchers replicate findings Represents an accessible resource for diverse industries, including health, transportation, tourism, economic growth, and banking, where researchers are not always econometrics experts

This book provides the most comprehensive treatment to date of microeconometrics, the analysis of individual-level data on the economic behavior of individuals or firms using regression methods for cross section and panel data. The book is oriented to the practitioner. A basic understanding of the linear regression model with matrix algebra is assumed. The text can be used for a microeconometrics course, typically a second-year economics PhD course; for data-oriented applied microeconometrics field courses; and as a reference work for graduate students and applied researchers who wish to fill in gaps in their toolkit. Distinguishing features of the book include emphasis on nonlinear models and robust inference, simulation-based estimation, and problems of complex survey data. The book makes frequent use of numerical examples based on generated data to illustrate the key models and methods. More substantially, it systematically integrates into the text empirical illustrations based on seven large and exceptionally rich data sets.

The aim of this volume is to provide a general overview of the econometrics of panel data, both from a theoretical and from an applied viewpoint. Since the pioneering papers by Kuh (1959), Mundlak (1961), Hoch (1962), and Balestra and Nerlove (1966), the pooling of cross section and time series data has become an increasingly popular way of quantifying economic relationships. Each series provides information lacking in the other, so a combination of both leads to more accurate and reliable results than would be achievable by one type of series alone. Over the last 30 years much work has been done: investigation of the properties of the applied estimators and test statistics, analysis of dynamic models and the effects of eventual measurement errors, etc. These are just some of the problems addressed by this work. In addition, some specific diffi culties associated with the use of panel data, such as attrition, heterogeneity, selectivity bias, pseudo panels etc., have also been explored. The first objective of this book, which takes up Parts I and II, is to give as complete and up-to-date a presentation of these theoretical developments as possible. Part I is concerned with classical linear models and their extensions; Part II deals with nonlinear models and related issues: logit and probit models, latent variable models, incomplete panels and selectivity bias, and point processes. This textbook offers a comprehensive introduction to panel data econometrics, an area that has enjoyed considerable growth over the last two decades. Micro and Macro panels are becoming increasingly available, and methods for dealing with these types of data are in high demand among practitioners. Software programs have fostered this growth, including freely available programs in R and numerous user-written programs in both Stata and EViews. Written by one of the world's leading researchers and authors in the field, Econometric Analysis of Panel Data has established itself as the leading textbook for graduate and postgraduate courses on panel data. It provides up-to-date coverage of basic panel data techniques, illustrated with real economic applications and datasets, which are available at the book's website on springer.com. This new sixth edition has been fully revised and updated, and includes new material on dynamic panels, limited dependent variables and nonstationary panels, as well as spatial panel data. The author also provides empirical illustrations and examples using Stata and EViews. "This is a definitive book written by one of the architects of modern, panel data econometrics. It provides both a practical introduction to the subject matter, as well as a thorough discussion of the underlying statistical principles without taxing the reader too greatly." Professor Kajal Lahiri, State University of New York, Albany, USA. "This book is the most comprehensive work available on panel data. It is written by one of the leading contributors to the field, and is notable for its encyclopaedic coverage and its clarity of exposition. It is useful to theorists and to people doing applied work using panel data. It is valuable as a text for a course in panel data, as a supplementary text for more general courses in econometrics, and as a reference." Professor Peter Schmidt, Michigan State University, USA. "Panel data econometrics is in its ascendancy, combining the power of cross section averaging with all the subtleties of temporal and spatial dependence. Badi Baltagi provides a remarkable roadmap of this fascinating interface of econometric method, enticing the novitiate with technical gentleness, the expert with comprehensive coverage and the practitioner with many empirical applications." Professor Peter C. B. Phillips, Cowles Foundation, Yale University, USA.

This book is intended for a first year graduate course in econometrics. However, the first six chapters have no matrix algebra and can be used in an advanced undergraduate class. This can be supplemented by some of the material in later chapters that do not require matrix algebra, like the first part of Chapter 11 on simultaneous equations and Chapter 14 on time-series analysis. This book teaches some of the basic econometric methods and the underlying assumptions behind them. Estimation, hypotheses testing and prediction are three recurrent themes in this book. Some uses of econometric methods include (i) empirical testing of economic t- ory, whether it is the permanent income consumption theory or purchasing power parity, (ii) forecasting, whether it is GNP or unemployment in the U.S. economy or future sales in the c- puter industry. (iii) Estimation of price elasticities of demand, or returns to scale in production. More importantly, econometric methods can be used to simulate the effect of policy changes like a tax increase on gasoline consumption, or a ban on advertising on cigarette consumption.

This book aims to fill the gap between panel data econometrics textbooks, and the latest development on 'big data', especially large-dimensional panel data econometrics. It introduces important research questions in large panels, including testing for cross-sectional dependence, estimation of factor-augmented panel data models, structural breaks in panels and group patterns in panels. To tackle these high dimensional issues, some techniques used in Machine Learning approaches are also illustrated. Moreover, the Monte Carlo experiments, and empirical examples are also utilised to show how to implement these new inference methods. Large-Dimensional Panel Data Econometrics: Testing, Estimation and Structural Changes also introduces new research questions and results in recent literature in this field.

Panel Data Econometrics: Theory introduces econometric modelling. Written by experts from diverse disciplines, the volume uses longitudinal datasets to illuminate applications for a variety of fields, such as banking, financial markets, tourism and transportation, auctions, and experimental economics. Contributors emphasize techniques and applications, and they accompany their explanations with case studies, empirical exercises and supplementary code in R. They also address panel data analysis in the context of productivity and efficiency analysis, where some of the most interesting applications and advancements have recently been made. Provides a vast array of empirical applications useful to practitioners from different application environments Accompanied by extensive case studies and empirical exercises Includes empirical chapters accompanied by supplementary code in R, helping researchers replicate findings Represents an accessible resource for diverse industries, including health, transportation, tourism, economic growth, and banking, where researchers are not always econometrics experts