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Editors' introduction

Structure and dynamics in econometrics

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This collection of papers finds its origins in two conferences hosted by the Tinbergen Institute and held in Amsterdam (14–15 December 1990) and Rotterdam (13–14 December 1991), respectively. These events initiated a series of small scale intensive conferences, labelled $(EC)^2$ meetings. The $(EC)^2$ acronym stands for *European Conference of the Econom(etr)ics Community*. The third and fourth meetings in this annual sequence took place in Paris (10–11 December 1992) and in Oxford (16–19 December 1993), and the next meeting is planned in Berlin (December 1994).

The main aim of the $(EC)^2$ conference series is to build and maintain an adequate forum for both senior and junior researchers in quantitative economics and econometrics. These meetings are meant to extend national research group and workshop meetings to a European level and are characterized by their focus on a particular theme, a limited number of participants, no parallel sessions, constructive and stimulating interaction via formal and informal discussions and poster sessions.

The first two of these conferences were held under the theme 'Structure and Dynamics in Econometrics', which covers of course a rather broad area. At both meetings about a dozen papers were presented and discussed in plenary sessions, and another twenty in lively poster sessions. Most of these papers addressed the major issues that are at stake in present-day frontline econometrics research programmes, focussing especially on those in the context of the structural econometric analysis of dynamic economic relationships on the basis of

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time-series data. Hence, most presentations centred around topics such as selection, specification, identification, estimation, and testing of full or partial systems of dynamic equations, with special emphasis on issues like analysis and detection of nonstationarity, trends and unit roots, cointegration, causality, encompassing, exogeneity, seasonality, and further the generation of accurate statistical inference on relevant economic phenomena from finite samples of discrete longitudinal observations. This comprehensive focus on fundamental, mostly mathematical–statistical issues in quantitative economic research is also reflected in the papers that, after a rigorous reviewing and revising process, are collected here.

This special issue is by no means a proceedings volume. Since more than sixty papers were discussed at the Amsterdam and Rotterdam meetings of $(EC)^2$, it is obvious that the twelve papers of this issue reflect only a limited part of the work presented. Many of the papers on the programme have been or will be published elsewhere; others have served merely to sharpen particular research issues and may perhaps never get published. In our opinion this is as it should be in the generation and dissemination of frontline research.

All of the twelve papers included in this issue deal with aspects of modelling or handling dynamics. Each in their own way tries to put either structure into econometrics or extract structural economic information from the data by econometric techniques. The separate studies can be grouped in various ways. A few articles concentrate primarily on dynamic relationships between stationary variables, which up to very recently was seen by the profession as the only relevant reference case. However, also in these papers attention is paid to how the results would be affected in case the variables are possibly nonstationary. The, now fully and widely recognized, basic fact of nonstationarity of much of economic life has brought much new structure and dynamics in the field, and of course most of the included papers focus on various aspects and consequences of stochastic and/or deterministic trends in the observed time-series data for modelling and inference in econometrics. Some of the studies are mainly asymptotic in nature, and others take small sample considerations into account, either analytically or by Monte Carlo simulation. As usual, generality and precision in one particular direction is often obtained at the expense of restricting regularity assumptions concerning other aspects such as: normality of disturbances, infinite sample sizes, correctly specified models, single nonsimultaneous equations instead of full systems of interdependent variables, i.e., strongly exogenous regressors instead of weakly exogenous or jointly dependent explanatories. Most of the papers are not purely theoretical and include empirical applications. As it happens, most of these illustrations concern the money market.

The first three papers of this issue examine aspects of statistical inference in systems of structural equations, primarily focussing on situations where the variables involved are either stationary or integrated upto order one. In this context Søren Johansen and Katarina Juselius discuss the fundamental notion

of identification. They distinguish generic, empirical, and economic identification, and they highlight that in a model with cointegration there is an identification problem for both the long-run and the short-run parameters. A switching algorithm is proposed for calculating the parameters under the linear identifying restrictions. In an extensive and original empirical study their various concepts and econometric methodology are shown to be operational. The next two papers focus on testing for the stability of relationships between integrated variables. Peter Boswijk's paper offers a Wald test for stability in error-correction models, which the author relates to and carefully distinguishes from tests for cointegration and for weak exogeneity. Boswijk does not start off from a closed reduced form VAR system, but considers a partial system of structural error correction relationships involving also a number of conditioning variables. The asymptotic properties of the tests are examined, Monte Carlo experiments provide the critical values, and the applicability of the procedures is illustrated. In the next paper Frank Kleibergen and Herman van Dijk develop classical parametric tests for cointegration in a complete VAR model by verifying rank reduction of the long-run multiplier matrix through Gauss elimination. The limiting distributions of Wald, likelihood ratio, and Lagrange multiplier tests are compared with Johansons likelihood ratio test, and they are shown to depend on the (Granger-causal) ordering of the variables. The authors also propose a two-step estimation procedure which is a system generalization of the Engle–Granger method.

Next we have two papers which focus on the characterization of the structure of single variables as such, especially on the occurrence and the multitude of unit roots. James Stock considers the unit root problem not as a hypothesis testing problem with special emphasis on the null hypothesis, but as a decision problem where two states of the system are treated symmetrically. He proposes classification procedures to categorize time series as being either I(0) or I(1). He also allows for a polynomial deterministic trend, or a broken trend line with unknown breakpoint. The resulting classifying procedure is shown to be consistent, and when applied to the Nelson–Plosser data it yields results that corroborate the original inferences. In the other paper on the characterization of single time-series Philip Hans Franses investigates seasonal time series. He exploits the ML-cointegration methodology for VAR models to device a model selection strategy for univariate time series with a recurring typical seasonal pattern by putting the single seasonal series in a system of series for each season separately. This allows him to distinguish between nonseasonal unit roots, seasonal unit roots, and periodic integration. He presents critical values for his test procedure and reports encouraging results for quarterly data that have been studied in the literature before.

In the following two papers the joint occurrence of I(1) and I(2) variables in models is studied. First, Niels Haldrup analyzes in a systematic way how the residual-based Dickey–Fuller test for the model with I(1) variables is affected in

single multiple regression models in case some of the variables are actually integrated up to order two and possibly contain deterministic components as well. Both asymptotic results and small sample critical values based on Monte Carlo experiments are reported, and for the choice of the proper critical value it is shown that checking whether I(2) variables are present is extremely important. Next, Stéphane Gregoir and Guy Laroque consider multivariate models and develop tests for cointegration in general higher-order systems, when there might be polynomial cointegration, or multicointegration as others prefer to label this. This paper may be interpreted 'as a bridge between the work of Johansen and that of Stock and Watson' (quote from the authors). They use regression methods and principal components techniques to compute estimators and develop test procedures, and in a rigorous way the asymptotic distributions of the various statistics are investigated.

Then three papers follow which are explicitly put into the more classical context of dynamic models for stationary variables, although they discuss the consequences implied by nonstationarity for the present results. Jan Kiviet and Garry Phillips find approximations to the finite sample bias of the least-squares estimator in the higher-order autoregressive distributed lag model and special linearly restricted variants such as the single-equation liner error-correction model. In simulations and illustrations it is found that an approximation obtained via large sample asymptotics can be exploited such that more accurate and efficient estimators are obtained in finite samples; approximations derived from small disturbance asymptotics are found to be deficient in dynamic models. The study by Bernadette Govaerts, David Hendry, and Jean-François Richard considers the choice of regressors problem and the derivation of Wald encompassing tests in stationary models in the presence of weakly exogenous and lagged dependent regressors. Conditions are indicated which allow one to restrict the analysis to conditional submodels. This setting requires a more precise definition of encompassing in connection with the notion of nesting. Also the prediction effects of encompassing tests are examined, and asymptotic results are compared with finite sample findings in Monte Carlo experiments. The third study that addresses problems analyzed primarily in the context of relationships between stationary variables is the paper by Hafida Boudjellaba, Jean-Marie Dufour, and Roch Roy. They report on simplified conditions for noncausality in vector ARMA models. Test statistics are derived from these new conditions and their use is exemplified in a monetary model. The assessment of noncausality is important for the simplification of inference. The results obtained here indicate more feedback between the variables than uni-directional causality.

The final two papers of this issue each focus on further distinct aspects of dynamic modelling. Widening the VAR model is important, e.g., for the study of financial series where clusters of volatility are present. This phenomenon is often studied using (G)ARCH processes. The study by Esther Ruiz implements

a Kalman filtering approach to estimating volatility models. Its efficiency is analyzed, and by Monte Carlo experiments the small sample properties are examined. Her approach allows for distributions with heavier tails than the normal. Empirical results are obtained using the yen/dollar exchange rate. Models are to be used, not to be believed. Given this quote, impulse response functions are important tools to study the effects of shocks to a dynamic system. The study by Marco Lippi and Lucrezia Reichlin brings us back to the beginning of this issue where identification was studied. Lippi and Reichlin indicate conditions under which the impulse response function is no longer identified in a VAR structure. In this context they make use of the concept of a Blaschke matrix. The empirical results show the operational implications of their procedure.

The primary purpose of this introduction and especially of the excerpts of the included articles given above, is to stimulate readers to skip in fact this introduction and to enjoy and peruse the various included articles themselves. Before you do so, we want you to take notice of the following. We cordially want to thank all those who contributed to the start-up of the $(EC)^2$ conference series. The major sponsor of the first two events has been the Tinbergen Institute, which is the joint research institute and graduate school of the faculties of economics of Erasmus University Rotterdam, the University of Amsterdam, and the Free University in Amsterdam. The financial support by the Royal Netherlands Academy of Sciences, by the Faculty of Economics and Econometrics of the University of Amsterdam, and by the Faculty of Economics of the Erasmus University is gratefully acknowledged too. We are happy that financial support for continuation of the series at locations in other countries has already been awarded by French and British organizations, and that for the near future the $(EC)^2$ series, especially the participation by young scholars, will be supported by funds provided by the Commission of the European Communities. Finally we want to thank the editorial board of this journal for giving us the opportunity to report on and to record parts of the first two $(EC)^2$ meetings in these prominent annals.

Referees

The persons mentioned below acted as anonymous referees for the papers published in this special issue:

Bierens, Herman J.
Boswijk, H. Peter
Dolado, Juan
Ericsson, Neil
Florens, Jean-Pierre
Galbraith, John
Granger, Clive W.
Haldrup, Niels
Hendry, David F.
Johansen, Søren
Juselius, Katarina
Kiviet, Jan F.
Kleibergen, Frank
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Lütkepohl, Helmut
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Nelson, Daniel B.
Nijman, Theo
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Richard, Jean-François
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