Editorial

Celebrated Econometricians: Katarina Juselius and Søren Johansen

Rocco Mosconi [1] and Paolo Paruolo [2,*]

1 Dipartimento di Ingegneria Gestionale, Politecnico di Milano, Via Lambruschini 4/B, 20156 Milano, Italy; rocco.mosconi@polimi.it
2 European Commission, Joint Research Centre (JRC), Via E. Fermi 2749, 21027 Ispra, Italy
* Correspondence: paolo.paruolo@ec.europa.eu

This Special Issue collects contributions related to the advances in the theory and practice of Econometrics induced by the research of Katarina Juselius and Søren Johansen, whom this Special Issue aims to celebrate.

The research of Katarina and Søren has been advancing Econometrics on fundamental issues, such as on common trends, equilibrium relations, adjustment to the (dis-)equilibrium relations, rationality of agents and on the discussion of resulting policy recommendations. Their research addressed issues of representation, identification, estimation, inference and policy implications, developing methodology and providing inspiring and paradigmatic applications in several applied areas of Economics.

One main body of work in Katarina's and Søren's research concerns Cointegration analysis using Vector Autoregressions (VAR), often referred to CVARs, both when the variables are integrated of order 1 (I(1)) and 2 (I(2)). Their contributions go beyond CVARs and have a very wide range, which is also partly reflected in the contributions of this Special Issue.

As a collection, the papers appearing in this Special Issue continue this tradition by providing advances on several topics, many of them related to the econometric analysis of nonstationary time-series. At the same time, from a complementary angle they also offer a recent perspective on the scope, breath and importance of some of the contributions of Katarina and Søren to Econometrics.

The papers in this Special Issue are both theoretical and applied, and they are grouped in the following areas for simplicity of exposition in this editorial. A first group of papers provides a historical perspective on Katarina's and Søren's contributions to Econometrics. A second group concentrates attention on representation theory; a third one focuses on estimation and inference. A fourth one deals with extensions of CVARs for modeling and forecasting, and a final fifth group is centered on empirical applications. These groups of papers are reviewed below; a final section of this editorial is dedicated to our many thanks associated with the preparation of this Special Issue.

1. A Historical Perspective

A first set of four papers, Archontakis and Mosconi (2021), Juselius (2021), Mosconi and Paruolo (2022a, 2022b), focuses on some of the contributions from Katarina and Søren to Econometrics, especially on early developments of cointegration.

Two separate interviews (Mosconi and Paruolo 2022a, 2022b), offer the reader a glimpse of Katarina's and Søren's motivation, hurdles and accomplishments in developing their research agenda. While several other joint interviews of Katarina and Søren exist, the ones in this Special Issue focus on their distinct contributions and hopefully provide a better account of their personal points of view.

Katarina's paper (Juselius 2021) is a complement to her interview in Mosconi and Paruolo (2022a); in this paper she gives account of her 'Research Odyssey' associated with the idea to understand macroeconomic data. She discusses rational and imperfect

knowledge expectations and how to learn from the many periods of crisis. The paper gives a concise but comprehensive overview of Katarina's model building approach based on "searching for a theory that fits the data" rather than "data that fits the theory".

Archontakis and Mosconi (2021) provide an bibliometric analysis on Katarina's and Søren's publications using a multivariate Bass model. They distinguish methodological and applied papers citing Katarina's and Søren's research and find cross-fertilization between the two areas. They show that the number of applied papers per quarter citing Katarina's and Søren's work does not seem to have peaked yet, while the methodological literature referring to their work reached the peak after the turn of the century, with a flat trajectory after the maximum (a similar behavior is observed in a minority of Nobel prize winners, and it is defined as "staying power" in the literature).

2. Representation

A second set of four papers (Barigozzi et al. 2020; Bauer et al. 2020; Franchi and Paruolo 2021; Johansen 2019) is concerned with representation theory, which plays a central role in Cointegration. An example of this is Granger's Representation Theorem, which shows that Cointegration (Common trends) and Equilibrium Corrections Mechanism (ECM) are dual concepts.

Søren's paper (Johansen 2019) derives the CVAR(∞) representation, and the corresponding finite order approximation, for a subset of observed variables generated by a higher dimensional CVAR model with lag order 1, which also includes a set of unobserved strongly exogenous random walks. The paper discusses cointegration, non-causality and weak exogeneity conditions for the observed variables and is motivated by some of the hypotheses proposed in Hoover (2020) in this Special Issue. The two papers allow to connect more explicitly cointegration analysis with the approach to modeling based on causal graphs.

Barigozzi et al. (2020) consider I(1) dynamic systems with fewer shocks than variables and that are in this way "singular". Examples of these systems belong to the classes of Dynamic Factor Models (DFM) and DSGE models. They discuss conditions for existence of cointegration and ECM and discuss how the VAR representation can be chosen to have finitely many lags.

Bauer et al. (2020) discuss the system representation of VARMA processes with any integration order at any frequency, using a particular parametrization called the canonical form. They discuss the topological properties of the parametrization, using the cases of I(1) and I(2) systems at zero frequency as illustrations. These properties are used to discuss sequences of hypotheses in the I(1) and I(2) cases.

Finally, Franchi and Paruolo (2021) discuss the notion of basis of the cointegration space when processes are integrated of any integer order. They show that polynomial cointegration vectors correspond to root functions, for which several results from the literature exists. They show that several polynomial cointegration spaces can be defined for I(d) systems with $d = 2, 3, \ldots$, but that a relevant notion (invariant to this choice) is the one of canonical sets of root functions, which act as bases of these spaces. The I(2) case is used to illustrate how some results from the literature can be applied to reduce the number of elements in the canonical set of root functions, i.e., how to make this basis minimal in an appropriate sense.

3. Inference

The third set of four papers is concerned with the derivation of new (asymptotic) results for estimation and inference in cointegrated systems (Bernstein and Nielsen 2019; Hansen 2018; Kurita and Nielsen 2019; Li and Bauer 2020).

Hansen (2018) considers GMM estimators for the Reduced Rank Regression model and shows that it is identical to the Maximum Likelihood Estimator under Gaussianity derived in Johansen (1988). This shows that Normality is not needed to motivate the Reduced Rank Regression estimator.

Bernstein and Nielsen (2019) consider the asymptotic distribution of the Likelihood Ratio (LR) test for cointegration rank and of the LR test for known cointegration vectors when the true cointegration rank is lower than the one in the tested hypothesis. They illustrate their results with an analysis of monthly US treasury bonds with one and two year maturity, testing for a stationary yield rate spread.

Kurita and Nielsen (2019) consider partial models with breaks in deterministic terms and Pseudo LR test for the cointegration rank; they derive and tabulate the relevant limit distributions. They illustrate their results with the analysis of partial system of UK–Germany log trade balances and the wedge between unit labor costs, conditional on UK and German Gross Domestic Products and the terms of trade.

Li and Bauer (2020) consider estimation in I(2) VAR models when the lag length is chosen as an increasing function of sample size, to allow for VARMA-type data generating processes. Their result are similar to the ones obtained for I(2) systems with fixed lag-length under appropriate conditions on the growth of the lag-length.

4. Modeling and Forecasting

A fourth set of four papers is concerned with modeling and forecasting (Castle et al. 2017; Haldrup and Rosenskjold 2019; Hetland 2018; Hoover 2020).

Hetland (2018) proposes and discusses an extension of the CVAR model called the Stochastic Stationary Root Model. Properties of the process are discussed. Because the likelihood cannot be computed in closed form, a particle filtering approximation is proposed and discussed.

Haldrup and Rosenskjold (2019) consider modeling log death rates by age and time, using US and French mortality tables. They propose a parametric model and fit it with a two step procedure; this allows them to extract four common factors that are later analyzed as a CVAR.

Hoover (2020) discusses the use of CVARs for the analysis of causality links among variables in the form of Directed Acyclical Graphs. An earlier version of this paper generated the problem addressed in Johansen (2019), and the published version of the paper illustrates Johansen (2019)'s results in this context.

Castle et al. (2017) discuss systematic forecast failure, called forediction failure. They propose a step-indicator saturation test to check in advance for invariance of forecast performance to policy changes. A simulation study is used to estimate the potency of this invariance test.

5. Applications

A final set of three papers focuses on applications, (Gjelsvik et al. 2020; Goldberg et al. 2020; Lütkepohl and Netšunajev 2018).

Lütkepohl and Netšunajev (2018) study the relationship between the stock market and monetary policy. They consider a CVAR for log industrial production, log consumer prices, log non-energy commodity prices, the log Euro Stoxx price index and the 3 month Euribor rate. They extend the CVAR model to include a two-states Markov-switching mechanism for the conditional covariance matrix. They use this model to test alternative identification schemes connecting the variables, and produce impulse responses for the chosen specification. For this specification, a contractionary monetary policy shock induces long-lasting (albeit long-run neutral) negative effects on production and on the price level.

Gjelsvik et al. (2020) analyze wage formation in Norway using data from manufacturing, private services and the public sector. They use a partial model of log wages in these three sectors along with the log of the consumer price index, conditionally on a set of other variables. They also allow for broken deterministics and use the critical values derived in Kurita and Nielsen (2019) for cointegration rank determination. They conclude that collective wage negotiations in manufacturing have defined wage norms over the period 1980Q1-2014Q4.

Goldberg et al. (2020) consider the Bilson–Fama regression of future change of the spot exchange rate on the forward premium and find break points for nearly every country. This and further analyses question the widespread view that currency returns are predictable or that developed country markets are less rational.

6. Thanks

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