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Call for Papers

Special issue of the journal *Computational Statistics* on
Computational Econometrics with **gretl**

Guest Editors: A. Talha Yalta, Allin Cottrell, and Paulo Canas Rodrigues

The landscape of statistical computing has undergone dramatic changes over the past 20 years, on account of the advent of massively large data sets and the contamination with methods and ideas originating from the machine learning community. In such a context, availability of quality software is of paramount importance; not only in terms of algorithmic efficiency, but also with a view to ensuring fully replicable, affordable computing via free and inspectable software.

The **gretl** project has been in development for over 20 years and is one of the leading free software packages available for econometrics and applied economics. The bi-annual Gretl Conference (<https://gretlconference.org>) is an inspiring opportunity to take stock of the current state of the **gretl** software project, including its embedded programming language **hansl**.

This special issue is intended to include some of the best papers presented at the 8th Gretl conference to be held in Gdańsk (Poland), June 15–16, 2023. Any Gretl-related topic will be considered, including (but not limited to) the following:

- new user-written function packages, including code for modeling and estimation, forecasting, graphical analysis, data management, or reporting
- use or evaluation of existing **gretl** commands
- methods for teaching statistics with **gretl** or teaching the use of **gretl**
- case studies of **gretl** use in novel areas or applications
- surveys or critiques of **gretl** facilities in specific fields
- comparisons of **gretl** with other software or use of **gretl** together with other software
- computational techniques of interest to users and developers of open source software

All papers will be refereed and subject to the same high-quality standards as regular submissions to the journal *Computational Statistics*.

Paper submission

Submitted articles must not have been previously published or currently submitted for journal publication elsewhere. As an author, you are responsible for understanding and adhering to the submission guidelines of *Computational Statistics* available in <https://www.springer.com/statistics/journal/180>.

Papers should be submitted online at <https://www.editorialmanager.com/cost/default.aspx>.

Please select “**S.I.: Computational Econometrics with **gretl****” as article type in the editorial manager system to make sure that your article gets assigned to this special issue (rather than being handled as a regular submission).

Please forward the confirmation e-mail you receive from Springer to A. Talha Yalta (talhayalta@gmail.com) upon successful submission of your manuscript so we can keep track of the articles submitted for this SI.

Important dates

| | |
|--|---------------------------------|
| Submission Window: | July, 1 2023 – October, 31 2023 |
| First notification to authors: | February 5, 2024 |
| Deadline to submit the revised paper: | April 8, 2024 |
| Review of first revision communicated: | June 3, 2024 |
| Deadline to submit the second revision: | August 5, 2024 |
| Review of second revision communicated: | October 7, 2024 |
| Further reviews and final decision: | December 2, 2024 |
| Publication of the Special Issue in print: | Q1 2025 |

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Programme of the 8th Gretl Conference, June 15-16, 2023, Gdańsk, Poland

June 14, 2023 Wednesday

19.00 Informal get-together dinner, Browar Gdańsk PG4 Podwale Grodzkie 4, <https://pg4.pl/en>,
Google Maps: <https://goo.gl/maps/48zYK1R7E7Fc7poc6>
(payment for dinner not included in conference fee)

June 15, 2023 Thursday

9.30 – 9.45 Opening

Marcin Kalinowski, President of the Research Federation of WSB & DSW Universities

9.45 – 11.15 Session I – The European Solidarity Centre, workshop room no. 4 (3rd floor)

Chair: Riccardo (Jack) Lucchetti

9.45 – 10.35 Giampiero M. Gallo (Corte dei conti, New York University in Florence, and CRENoS)
Modeling financial time series with multiplicative errors

10.35 – 11.15 Allin Cottrell (Wake Forest University)
New developments for gretl function packages

11.15 – 11.45 Coffee Break

11.45 – 12.45 Session II – The European Solidarity Centre, workshop room no. 4 (3rd floor)

Chair: Sven Schreiber

11.45 – 12.15 Marco G. Ercolani (University of Birmingham)
A comparison of Johansen cointegration VECM estimates: why do they differ between software?

12.15 – 12.45 Marco Tedeschi, Giulio Palomba and Matteo Foglia (Università Politecnica delle Marche)
Disentangling the geopolitical risk and its effects on commodities. Evidence from a panel of G8 countries

12.45 – 14.00 Lunch, AmberSide Restaurant, The European Solidarity Centre (ground floor)

14.00 – 15.30 Session III – The European Solidarity Centre, workshop room no. 4 (3rd floor)

Chair: Allin Cottrell

14.00 – 14.30 Riccardo (Jack) Lucchetti and Francesco Valentini (Università Politecnica delle Marche)
Linear models with time-varying parameters in gretl: comparing different approaches

14.30 – 15.00 Luca Pedini (Università Politecnica delle Marche)
Bayesian regression models in gretl

15.00 – 15.30 Marcin Błażejowski^a and Jacek Kwiatkowski^b (^aWSB Merito University in Toruń, ^bNicolaus Copernicus University in Toruń)
BACE: A gretl Package for Model Averaging in Limited Dependent Variable Models

15.30 – 16.00 Coffee Break

16.00 – 17.00 gretl Association meeting

The European Solidarity Centre, workshop room no. 4 (3rd floor)

20.00 Official Dinner, Geneza Jedzenia i Wina Restaurant, <https://geneza.net/>,
Google Maps: <https://goo.gl/maps/PKRHgNnPHWfoXUsVA>,
(payment for dinner included in conference fee)

June 16, 2023 Friday**9.45 – 11.15 Session IV** – The European Solidarity Centre, workshop room no. 4 (3rd floor)**Chair: Giulio Palomba**9.45 – 10.15 Ioannis A. Venetis^a and Paraskevi Salamaliki^b (^aUniversity of Patras, ^bUniversity of Ioannina)
*Principal components based estimation of multilevel factor models*10.15 – 10.45 Artur Tarassow ()
*The use of AI LLMs for coding with gretl*10.45 – 11.15 Xiaohong Xie and Magdalena Osińska (Nicolaus Copernicus University in Toruń)
Optimal Collective Hybrid Pension Plans: Mortality-Adjusted Investment Strategies with Intergenerational Risk-Sharing Mechanisms

11.15 – 11.45 Coffee Break

11.45 – 12.45 Session V – The European Solidarity Centre, workshop room no. 4 (3rd floor)**Chair: Ioannis A. Venetis**11.45 – 12.15 Luca Pedini (Università Politecnica delle Marche)
*Bayesian VAR in gretl*12.15 – 12.45 Marcin Błażejowski (WSB Merito University in Toruń)
Which C compiler and BLAS/LAPACK library should I use - gretl's numerical efficiency in different configurations

12.45 – 14.00 Lunch, AmberSide Restaurant, The European Solidarity Centre (ground floor)

14.00 – 17.00 ECS's Exhibiton

20.00 Unofficial Dinner: meeting place will be set spontaneously
(payment for dinner not included in conference fee)

Abstracts

Marcin Błażejowski

WSB Merito University in Toruń

Session V

Which C compiler and BLAS/LAPACK library should I use – gretl’s numerical efficiency in different configurations

gretl might be compiled with different C compilers and linked against different BLAS/LAPACK libraries. Some of them are free (as a speech) and some of them are for free (as a beer). As default we assume that user compiles **gretl** with **gcc** (a part of the GNU Compiler Collection¹) and links it against OpenBLAS². But this scenario might not be optimal. Why?

Compilers: for some time we can observe a rapid progress in compilers based on Clang/LLVM³. Referring only to the most obvious choices, one can use vanilla **clang** or Intel’s **icx**⁴ or AMD’s **aocc**⁵. So the natural question arises here: which one would be the best choice?

BLAS/LAPACK: OpenBLAS – one of two GotoBLAS2⁶ successors – is de facto standard in linear algebra computations world. But again, we have several – free or proprietary – possible options here. Users of Intel-based machines may think about Math Kernel Library⁷ (MKL), while AMD’s users may think about AMD Optimizing CPU Libraries⁸ (AOCL). The former is closed-source, while the later is based on BLIS/libFLAME⁹ – the second GotoBLAS2 successor. And again, a natural question here is: which one suits the user’s needs best.

The main goal of this research is to find out which combination of C compiler and BLAS/LAPACK library is optimal for Intel- and AMD-based machines in terms of numerical efficiency. The results consist of a series of simulations based on both: simulated and real datasets. In addition, results of simulations based on computationally demanding econometrics approaches such as Bayesian Model Averaging will be presented.

Marcin Błażejowski^a and Jacek Kwiatkowski^b

^a *WSB Merito University in Toruń*, ^b *Nicolaus Copernicus University in Toruń*

Session III

BACE: A gretl Package for Model Averaging in Limited Dependent Variable Models

This paper presents a software package called BACE (Bayesian Averaging of Classical Estimates) which offers model-building strategy for various limited dependent variable models, including logit and probit models, ordered logit and probit models, multinomial logistic regression, Poisson regression, Tobit model, and interval regression. BACE strategy is a model selection method that incorporates both classical estimation and Bayesian techniques. It solves the problem of computation speed and model uncertainty that arise when dealing with a large number of competing advanced statistical models. Our BACE package is both fast and capable of delivering consistent results. The package also provides implementation of the latest proposals of BIC variants,

¹ <https://gcc.gnu.org/>

² <https://www.openblas.net/>

³ <https://clang.llvm.org/>

⁴ <https://www.intel.com/content/www/us/en/developer/articles/guide/porting-guide-for-icc-users-to-dpcpp-or-icx.html>

html

⁵ <https://www.amd.com/en/developer/aocc.html>

⁶ <https://www.tacc.utexas.edu/research-development/tacc-software/gotoblas2>

⁷ <https://www.intel.com/content/www/us/en/docs/onemkl/get-started-guide/2023-0/overview.html>

⁸ <https://www.amd.com/en/developer/aocl.html>

⁹ <https://github.com/flame>

and the latest measures of jointness. We use **gretl**, a popular, free, and open-source software for econometric analysis that features an easy-to-use graphical user interface.

Marco G. Ercolani
University of Birmingham

Session II

A comparison of Johansen cointegration VECM estimates: why do they differ between software?

Typically, different software produces the same parameter estimates if the same time-series model is estimated on the same data. Standard errors and other statistics might differ slightly if the regression degrees of freedom have been programmed in subtly different ways but, if estimation convergence is achieved, the parameters will be the same to any reasonable degree of accuracy. However, when estimating a vector error correction model (VECM) based on Johansen's (1988) cointegration method, different software can produce very different parameter estimates. This is due to the different ways in which default identification restrictions are implemented on constants, trend parameters and coefficients. The identification challenge can be split into the orthogonalization problem related to long/short-run constants and trend parameters, and the normalisation problem related to the cointegration coefficients. By comparing the VECM regression output of Gretl and other software, we are given an insight into the thorny issue of VECM model identification, and an understanding of Johansen's proposed solution. Furthermore, we find cases where problems arise due to flawed programming.

Keywords: cointegration, identification, normalisation, orthogonalization, VECM

Giampiero M. Gallo
Corte dei conti, New York University in Florence, and CRENoS

Session I

Modeling financial time series with multiplicative errors

Time series connected to financial market activity share the empirical features of being non-negative valued and exhibiting the typical clustering: examples are realized volatility, volume, range, duration, number of trades, etc. As a matter of fact, the popular GARCH-type dynamics for squared returns can be extended to recognize that it is the product two elements, the conditional expectation of squared returns times an unpredictable error term. A bird's eye view on the merits of these Multiplicative Error Models will be presented with emphasis on the structure of a basic MEM from an estimation point of view, comparing ML and GMM approaches in the univariate case, and illustrating how some modifications of this specification are used to address the presence of a slow moving average level in the series.

In the multivariate case, the extension to a vector-MEM makes GMM the preferred estimator having the advantage of not requiring a parametric choice for the error distribution. The analysis is carried out with attention to some issues related to the system dimensionality, notably the possibility of applying an automated procedure to identify zeros in the relevant matrices of the dynamics, and the use of some dimensionality reduction techniques such as the Lasso.

Riccardo (Jack) Lucchetti and Francesco Valentini
Università Politecnica delle Marche

Session III

Linear models with time-varying parameters in **gretl: comparing different approaches**

This work aims at comparing several estimators for linear models with time-varying parameters by using different **gretl** packages. We compare them by means of simulated and real data focusing of both statistical and computational aspects. Our findings show that all the estimator at issue provide similar results but their practical viability can be far from trivial due to computational aspects. In what follows we report the preliminary findings and a brief discussion.

Luca Pedini*Università Politecnica delle Marche*

Session III

Bayesian regression models in gretl

This paper presents the **gretl** package **BayTool**, which is intended to provide a collection of Bayesian estimation functions to the user. The included specifications range from more traditional ones such as the linear model to more complex alternatives e.g., the Bayesian LASSO. Posterior distributions are obtained either using analytical formulae, when available, or via Markov chain Monte Carlo samplers.

Luca Pedini*Università Politecnica delle Marche*

Session V

Bayesian VAR in gretl

Bayesian Vector Autoregression has become a standard paradigm in modern macroeconometrics modelling: the **gretl** package **BVAR** aims to provide the user all the essential tools for performing such analyses. Flexible prior choices together with effective graphical tools are implemented, so as predictions or impulse response functions are easily obtainable and interpretable under different set-ups. From a computational perspective, the package takes fully advantage of the **gretl** parallelization architecture (via OpenMP) enabling a fast simulation of Bayesian distributions.

Artur Tarassow

Session IV

The use of AI LLMs for coding with gretl

The use of Artificial Intelligence Language Model Machines (LLMs) has surged within the last months years in the field of coding. The presentation shows the application of LLMs in programming with Gretl. We explore the potentials of code understanding and provide expert insight into the benefits of using LLMs for code refactoring, including renaming, formatting and readability.

We also delve into the power of LLMs for function writing and the improvement of help texts. Our findings suggest that AI LLMs can be instrumental in improving code efficiency, reducing errors, and providing better documentation.

Apart from Gretl programming, we extend our research to coding for gnuplot, a free and open-source graphing utility. We examine the potential applications of LLMs in the development of code documentation to assist students and academics in their research.

Our research demonstrates that by using AI LLMs, one can not only improve code quality and efficiency, but also foster a deeper understanding of the code. The implications of this study extend beyond econometrics and economics, having vital significance in the field of computer programming as a whole.

Marco Tedeschi, Giulio Palomba and Matteo Foglia*Università Politecnica delle Marche*

Session II

Disentangling the geopolitical risk and its effects on commodities. Evidence from a panel of G8 countries

Through a Time-Varying Parameter VAR (TVP-VAR), we examine the dynamic impact of GeoPolitical Risk (GPR) on commodity markets from January 2001 to October 2022. Using a country-specific GPR index, we study the time-varying impact of an exogenous shock of GPR first on itself and then on commodities (energy, food, metals). Our analysis reveals the crucial role of national economic structures in transmitting geopolitical risk between countries, especially those connected by economic ties such as the US and EU countries. We show the more heterogeneous impact of the Russia-Ukraine clashes on energy commodities than on other economic events. Furthermore, more recent events (COVID-19 and war) are more persistent in net-exporting countries.

The findings provide valuable insights to financial market regulators to mitigate external shocks and help governments improve macroeconomic stability.

Keywords: Geopolitical Risk, Time-Varying VAR, G8, Commodities prices, Risk spillover, Impulse Response Function

Ioannis A. Venetis^a and Paraskevi Salamaliki^b

^a *University of Patras*, ^b *University of Ioannina*

Session IV

Principal components based estimation of multilevel factor models

It contains a package GlobalFactors (a significantly updated version of GlobalFactors 0.1 already present) that estimates the number of global factors, and then consistently estimates global/local factors and loadings based on 4 different estimation procedures that of Choi et al. (2018), Choi et al. (2021), Chen (2022) and Lin & Shin (2022). Inference is also possible following the work of Lin & Shin (2022). These procedures implicitly assume known group membership and for that, an extension to unknown group membership will also be available in the package, based on the work of Uematsu & Yamagata (2022) on sparsity - induced weak factor models.

The presentation will include the package functioning, empirical applications from Choi et al. (2018), Choi et al. (2021), Chen (2022) and Lin & Shin (2022) extended to include all proposed methods and a novel application to national disaggregated HICP inflation rates.

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Xiaohong Xie and Magdalena Osińska

Nicolaus Copernicus University in Toruń

Session IV

Optimal Collective Hybrid Pension Plans: Mortality-Adjusted Investment Strategies with Intergenerational Risk-Sharing Mechanisms

necessitates the development of innovative pension plan structures and investment strategies. These strategies must effectively manage associated risks and encourage intergenerational equity (Gollier, 2008). This study explores optimal investment strategies for a collective hybrid pension plan. It incorporates an Overlapping Generations (OLG) model, an approach originally presented by Allais (1947) and Samuelson (1958), which encourages mechanisms for intergenerational risk-sharing.

Inspired by the seminal work of Heer and Maußner (2009), we construct a population model based on the OLG framework. The model simulates the intricate dynamics of pension plans using the Monte Carlo method and abides by the principles of Constant Relative Risk Aversion (CRRA). To seek an optimal combination of parameters to enhance welfare, we apply a grid search optimization technique. This technique incorporates iterations over a predefined range of values for the contribution rate, benefit rate, proportion of risky assets, and risk-sharing parameters. By integrating demographic, economic, and financial risks into our model, we generate time-varying contribution and benefit levels that align with welfare considerations. This thorough approach permits us to manage the complexities inherent in pension plan designs, offering a comprehensive strategy to tackle challenges posed by evolving demographic trends.

Our evaluation of the performance of collective pension schemes relies on certainty equivalent consumption (CEC) as a measure of welfare. The CEC offers a consistent metric to compare the welfare impacts of varying pension plan designs, facilitating the assessment of their relative effectiveness in promoting well-being (Cui et al., 2011). The study also contrasts the hybrid pension plan with traditional defined benefit and defined contribution plans, showcasing the unique benefits of our proposed hybrid approach.

Leveraging Python programming, we adjust the OLG model to accommodate the salient aspects of China's demographic dynamics, particularly by incorporating its real mortality rates. This tailoring underscores the relevance of bespoke investment strategies and astute risk management for ensuring the long-term stability of pension systems. Our findings suggest that well-orchestrated intergenerational risk-sharing mechanisms, incorporated within the OLG framework, can potentially elevate welfare and intergenerational equity more efficiently than traditional pension designs. Our robustness checks, including extensions of maximum age, the examination of effects on future generations, and modifications in the retirement age, further substantiate the reliability and applicability of our model. Significantly, our results demonstrate that the anticipated welfare improvement for the new entry cohort does not compromise the welfare of older or forthcoming cohorts. This finding strengthens the perceived equity and efficiency of our proposed model from an ex-ante standpoint.

In sum, this study meaningfully contributes to pension scheme design by integrating authentic mortality data into our model, highlighting the significance of intergenerational risk-sharing within hybrid pension schemes. Our findings offer insightful implications for policymakers, suggesting hybrid pension schemes as potential solutions to demographic challenges, particularly in nations such as China experiencing negative population growth. We anticipate this study will inform future research and policy innovations in pension systems.

Keywords: intergenerational risk, OLG model, hybrid pension CRRA

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