The 3^{rd} Gretl Conference

Presented by
The Department of Economics and Legal Studies in Business
Oklahoma State University

Marriott Courtyard Downtown
Oklahoma City, OK USA

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Program

Wednesday, 19 June

19:00 - 20:00	Welcome to Oklahoma City. We will assemble in the hotel's "The Grand Room" for an informal get-together, a snack, and the development of a proper plan for the remainder of the evening.

Thursday, 20 June

8:30 –	**Registration opens**
9:15 – 9:30	**Opening Remarks**, Location: Murray Room
9:30 – 11:00	**Invited Session: Keynote Address**, Chair: Lee Adkins – **James G. MacKinnon**, The Sir Edward Peacock Professor of Econometrics, Queen's University, *The Wild Bootstrap*
11:00 – 11:15	**Break**
11:15 – 12:30	**Invited Session: Gretl Today and Tomorrow**, Chair: Ignacio-Diaz Emparanza – **Riccardo "Jack" Lucchetti**, *gretl Usage: Evidence from Sourceforge* – **Allin Cottrell**, *Extending gretl: Addons and Bundles, revisited*
12:30 – 13:45	**Lunch**, Marriott Courtyard
13:45 – 15:15	**Contributed Session: Using Prior Information**, Chair: Magdalena Osińska – **Marcin Błażejowski** and **Jacek Kwiatkowski**, *Bayesian Model Averaging and Jointness Measures for Gretl* – **Lee C. Adkins**, *The RLS Stein-Rule Estimator: a function package* – **Peter M. Summers**, *BVAR: A Function Package for Estimating and Forecasting with Bayesian VARS in Gretl*
15:15 – 15:30	**Break**
15:30 – 16:30	**Contributed Session: Topics in Macroecnomics**, Chair: Peter Summers – **Paweł Kufel**, *Linear Congruent Dynamic Econometric Modelling for Nonlinear Relationships - Simulation in Gretl* – **Magdalena Osińska**, **Tadeusz Kufel**, **Marcin Błażejowski** and **Pawel Kufel**, *Business Cycle Synchronization in the EU Countries and the USA*
19:30	**Conference Dinner**, OKC Petroleum Club Downtown, 35th floor, OG&E Room

Friday, 21 June

9:00 – 10:30	**Contributed Session: Topics in Finance**, Chair: Marcin Błażejowski – **Mihaela Nicolau**, **Giulio Palomba** and **Ilaria Traini**, *Are Futures Prices Influenced By Spot Prices or Vice-Versa? A Crude Oil, Natural Gas and Gold Markets Analysis* – **Giulio Palomba** and **Luca Riccetti**, *Asset Management with TEV and VAR Constraints: How Risk Managers Should Fix Bounds* – **Naneida Lazarte-Alcala**, **Lee C. Adkins**, **Bidisha Lahiri**, and **Andreas Savvides**, *Remittances and Income Diversification in Bolivia's Rural Sector*
10:30 – 10:55	**Break** and Conference Photo
10:55 – 12:00	**Contributed Session: Function Packages**, Chair: Mihaela Nicolau – **Riccardo (Jack) Lucchetti** and **Claudia Pigini**, *HANSL Implementation of Dynamic Models for Binary Dependent Variables in Panel Data* – **Ignacio Díaz-Emparanza** and **M^a Paz Moral**, *Numerical Distribution Functions for Seasonal Stability Tests*
12:00 – 13:15	**Lunch**, Marriott Courtyard
13:15 – 15:00	**Gretl Development Roundtable Discussion**
15:00 –	**Closing Ceremony**

Abstracts

NUMERICAL DISTRIBUTION FUNCTIONS FOR SEASONAL STABILITY TESTS

Ignacio Díaz-Emparanza, Ma Paz Moral

Seasonality is one of the key characteristics of economic time series. Several tests for seasonal unit roots and seasonal stationarity can be found in the literature. One of the most popular methods was proposed by Canova and Hansen (1995) (CH), which may be considered as an extension of the Kwiatkowsky et al. (1992) test (KPSS) for zero frequency. They test the null hypothesis that the seasonal pattern is deterministic against the alternative of a nonstationary stochastic component, that is, the alternative includes the presence of unit roots at either a single seasonal frequency or a set of seasonal frequencies. The observed variable is regressed on seasonal deterministic components and the tests are made to check whether the coefficients are fixed or stochastic. The general procedure consists of:

- A joint test for stability at all the seasonal frequencies, with $(S-1)$ fixed regression parameters under the null hypothesis (being S the seasonal periodicity).
- $S/2$ (for S even) or $(S-1)/2$ (for S odd) individual tests for each seasonal cycle. The null hypothesis implies two fixed parameters (one only fixed parameter for the π frequency, if S is even).
- S individual tests for the stability of each seasonal component, with one fixed coefficient under the null hypothesis.

Canova and Hansen derived the asymptotic distribution of the statistics under general conditions, being a function of the number of parameter restrictions under the null hypothesis. The distributions of the tests for finite samples are unknown. The aim of this paper is to study these distributions by a numerical method. We present here a procedure, based on response surface regressions, that allows one to obtain critical values and p-values for the Canova-Hansen tests for any sample size, any frequency and any seasonal periodicity. The first step in implementing the response surface regressions is to estimate the relevant quantiles of the distributions of the CH tests for several combinations of T (sample size), p (number of fixed coefficients) and S (seasonal periodicity) from a large set of Monte Carlo simulations. Following MacKinnon (2002), the process is then repeated $M = 100$ times for each value of T to obtain more accurate results. Each experiment consists of a great number of replications (e.g. $N = 100,000$), where a series y_t is generated by the data generation process $y_t = u_t$ with $u_t \sim nid(0,1)$ and the equation estimated is the auxiliary regression (3 or 6) in the Canova-Hansen paper. For each set of replications the quantiles of the relevant CH statistics are calculated for three alternatives of the deterministic seasonal terms: trigonometric, centered dummies and uncentered dummies, and these quantiles are used as dependent variable in a regression depending on T, p, and S, the surface response regression. This estimated equation is used to calculate forecasts of a quantile for a given value of T, p, and S, and based on these forecasts we

may obtain estimated critical values and p-values. We have implemented these techniques in a **gretl** function package, and we complete the paper by an example using data on Tourism in Spain.

BAYESIAN MODEL AVERAGING AND JOINTNESS MEASURES FOR GRETL

Marcin Błażejowski, Jacek Kwiatkowski

Our paper presents a software package that implements Bayesian model averaging for **gretl** . The Bayesian model averaging (BMA) is a model-building strategy that takes account of model uncertainty into conclusions about estimated parameters. It is an efficient tool for discovering the most probable models and obtaining estimates of their posterior characteristics. In recent years we have observed an increasing number of software packages devoted to BMA for different statistical and econometric software. In this paper, we propose BMA package for **gretl** . We can list several reasons why, in our opinion, it is important to address this topic. **Gretl** is increasingly popular, free, open-source software for econometric analysis, both for students and academics. Unlike most other statistical software it has easy to use GUI interface. Our software package is, therefore, a free and easy tool for Bayesian model averaging.

RLS STEIN-RULE IN GRETL

Lee C. Adkins

The paper documents a **gretl** function package that is used for the RLS Stein-rule estimator. Judge and Bock (1981, pp. 240-42) proposed a family of Stein-rule estimators that dominates the MLE of the location parameters in the classical normal linear regression model (CNLRM) under weighted quadratic loss. The estimator is a linear combination of the unrestricted and restricted MLEs, where the degree of shrinkage is controlled using a conventional Wald test of the implied hypothesis restrictions. The **gretl** function computes the positive-part version of the RLS Stein-rule which allows user to specify the desired linear restrictions on the model and to select a loss function under which to compute the RLS-Stein rule. In the absence of specific prior information about parameter values Lindley's version of the James-Stein rule is particularly attractive; accordingly, it is available as a user specified option. The procedure also computes bootstrap standard errors [see Adkins (1990); Adkins and Hill (1990)]. A simple Monte Carlo simulation is performed to explore the risk characteristics of the RLS Stein-rule vs. those of pretest, restricted MLE, and unrestricted MLE. All of the computations are performed in **gretl**.

ARE FUTURES PRICES INFLUENCED BY SPOT PRICES OR VICE-VERSA? A CRUDE OIL, NATURAL GAS AND GOLD MARKETS ANALYSIS

Mihaela Nicolau, Giulio Palomba, Ilaria Traini

Considering the financial theory based on cash & carry model, the price of a futures contract is always influenced by the spot price of its underline asset, as long as, according to this model, the futures price is determined as the sum of the underline asset's spot price and its cost of carry. The aim of this paper is to verify if there are connections between spot and futures prices of commodities markets, and if these connections exist according to cash & carry model. The empirical analysis is made on daily prices returns of three different markets, respectively crude oil, natural gas and gold, and the sample period ranges from November 2004 to July 2012, having 2013 observations. A rolling Granger causality tests is employed on the entire sample and on two subsamples which represent the periods before and during the actual financial crises. The results show that interactions between spot and futures prices depend on market, futures contract's maturity and economic turmoil.

ASSET MANAGEMENT WITH TEV AND VAR CONSTRAINTS: HOW RISK MANAGERS SHOULD FIX BOUNDS

Giulio Palomba, Luca Riccetti

It is well known that investors usually assign part of their funds to asset managers who are given the task of beating a benchmark portfolio. On the other hand, the risk management office could impose some restrictions to the asset managers activity in order to maintain the overall portfolio risk under control. This situation could lead managers to select non-efficient portfolios in the total return and absolute risk perspective. In this paper we focus on portfolio efficiency when a tracking error volatility (TEV) constraint holds: first, we define the TEV Constrained-Efficient Frontier (TCEF), a set of TEV constrained portfolios that are mean-variance efficient. Second, we introduce a strategy to select TEV constrained-efficient portfolios among all the feasible portfolios; in this context, we also show that a bound on variance is more stringent than a restriction on Value-at-Risk (VaR). Finally, we suggest a simple rule to fix an optimal VaR constraint.

BUSINESS CYCLE SYNCHRONIZATION IN THE EU COUNTRIES AND THE USA

Magdalena Osińska, Tadeusz Kufel, Marcin Błażejowski, Paweł Kufel

The aim of the paper concerns answering the question how much business cycles in member countries of European Union are synchronized. Furthermore, the interest is put to the level of similarity between business cycle in the EU and the USA. Such analysis is still important due to some aspects of common economic policy that has to be newly established after the economic crisis of the years 2007-2009. The analysis will be focused on the impact of the mentioned crisis on similarity of business cycles. The research methodology concentrates on preparing quarterly data using X-13 ARIMA-SEATS and the Hodrick-Prescott filter, and then applying cross-spectral analysis. Particularly, the following tools of analysis will be used: the co-spectral density and the quadrature spectrum, coherency coefficient, phase coefficient, gain of Y over X, gain of X over Y, and some others. We expect not only to determine how much the economic cycles are synchronized, but also to improve technical aspect of the cross-spectral analysis in **gretl** with contribution of Octave/ Matlab.

LINEAR CONGRUENT DYNAMIC ECONOMETRIC MODELLING FOR NONLINEAR RELATIONSHIPS - SIMULATION IN GRETL

Paweł Kufel

The main purpose of the presentation is to compare linear congruent modelling to other models of nonlinear relationships. For real data one does not know the exact relationship between economic phenomena. Economic theory provides some guidance, but one must be cautious about the assumptions made in these theories. It is common that these assumptions are not satisfied in real world. A researcher must choose some type model from wide variety of those available.

The presentation will compare the modelling of different types of nonlinear relationships that are available in **gretl** using Monte Carlo simulations. Among the models considered is the linear dynamic congruent model. Comparison of model quality is based on forecasting errors and Diebold-Mariano test, which is implemented in **gretl** by the author.

HANSL IMPLEMENTATION OF DYNAMIC MODELS FOR BINARY DEPENDENT VARIABLES IN PANEL DATA

Riccardo (Jack) Lucchetti, Claudia Pigini

Given the increasing availability of panel datasets, software procedures to estimate non-linear models for binary longitudinal data are becoming essential for microeconometric applications. While static models are relatively mainstream and are supported by recent versions of **gretl** (albeit in varying degrees), dynamic models are more complex to implement. Historically, the first proposal is due to Heckman (1981) (who else?), who, building on the static random-effect estimator, proposed a model of the form

$$y^*_{i,t} = \phi y_{i,t-1} + \beta x_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{1}$$

with $y_{i,t} = I(y^* > 0)$ in which α_i and $\varepsilon_{i,t}$ are jointly normal. This model is estimated under the assumption of serially independent errors. Since in this setting $y_{i,0}$ is clearly not orthogonal to α_i, a linearised reduced-form equation for the initial value of the latent variable needs to be specified. If the individual effect α_i is assumed to be normally distributed, the integral over α_i may be evaluated by means of Gauss-Hermite quadrature, which was popularised in the econometrics literature by Butler and Moffitt (1982). Despite the fact that Gauss-Hermite quadrature is also the main ingredient in the well-known procedure for estimating random-effects panel probit models, no statistical package (free or commercial) offers a pre-canned routine for estimating Heckman's model. As a consequence, practitioners have been looking for computationally simpler alternatives.

Orme (1997; 2001) proposes a two-step estimator that takes into account endogenous initial conditions in similar manner as Heckman's two-step procedure accounts for endogenous sample selection, while Wooldridge (2005) deals differently with the initial conditions problem by finding the outcome distribution conditional on the initial value instead of dealing with the joint distribution of all outcomes. Both estimators employ techniques for dealing with the initial observation problem in such a way that estimation can be carried out through ordinary random-effect probit routines with the addition of some ad-hoc explanatory variables. A comparison between the two is provided in Arulampalam and Stewart (2009).

The feature that all the probit estimators mentioned so far share is the technique used to circumvent the computational difficulty of having to deal with multivariate normal integrals: since the joint probability function $P(y_{i,1}, \ldots, y_{i,T})$ can be written as

$$P(y_{i,1}, \ldots, y_{i,T}) = E[P(y_{i,1}, \ldots, y_{i,T}|\alpha_i)] \tag{2}$$

as long as $P(y_{i,1}, \ldots, y_{i,T}|\alpha_i)$ is inexpensive to compute, the log-likelihood for individual i can be recovered via Gauss-Hermite quadrature. However, multiple normal integrals can also be evaluated by simulation techniques such as GHK (see Geweke (1991)), which allow for any arbitrary correlation structure among disturbances and individual effects. An example in which this technique is employed is contained in Stewart (2006), in which autocorrelated error terms are allowed for.

The logit link function also has been used in panel data model for a long time in static specifications: in fact, as is well known, the logistic distribution hypothesis makes it possible to define a fixed-effects

estimator through a conditional ML approach. The static fixed-effect logit model proposed by Chamberlain (1980) is estimated by conditional maximum likelihood using the total scores as sufficient statistics for incidental parameters and its estimation is actually rather inexpensive, if compared to random effects models.

In the dynamic context, fixed-effect estimators have not become as popular as the random-effect ones in empirical works since they cannot be easily generalised to every time-configuration of the panel and require strong restrictions to the model specification.

The first proposal of a fixed-effect logit model can be found in (Chamberlain, 1985): as in the static formulation, estimation relies on conditional inference and, therefore, is rather simple to perform. Exogenous covariates, however, cannot be included and the proposed sufficient statistic for incidental parameters needs to be determined on a case-wise basis according to the time-series length. Honoré and Kyriazidou (2000) extend Chamberlain's formulation in order to include explanatory variables; this approach, however, requires a non-negligible computational effort due to the nonparametric evaluation of covariates distribution. In addition, time-dummies have to be excluded from the model specification.

Recently, Bartolucci and Nigro (2010) defined a dynamic model which belongs to the quadratic exponential family and it has a similar formulation to that of a dynamic logit model. The sufficient statistics for unobserved heterogeneity parameters are the total scores for every time length of the panel series and conditional ML estimation can be implemented in software by a suitable modification of ordinary static FE logit algorithms. Differently from Honoré and Kyriazidou (2000), time-dummies can be included in the model specification.

In this work we present the **gretl** implementation of the available set of tools to estimate dynamic models for binary panel data. In addition we review and compare the proposed estimators by means of a Monte Carlo experiment and empirical applications.

BVAR: A FUNCTION PACKAGE FOR ESTIMATING AND FORECASTING WITH BAYESIAN VARS IN GRETL

Peter M. Summers

This paper illustrates methods for estimating and forecasting with Bayesian vector autoregressions (BVARs) using the **gretl** software package. The default specification uses a Normal-Inverse Wishart prior, with coefficient estimates and forecasts generated from the posterior mean without Gibbs sampling. The prior specification is very flexible and incorporates the "dummy observation" technique that has become the standard, for example in Dynare. Gibbs sampling from the posterior or predictive distribution is also available as an option. The various commands and options are illustrated with an extended example.

REMITTANCES AND INCOME DIVERSIFICATION IN BOLIVIAS RURAL SECTOR

Naneida Lazarte-Alcala, Lee C. Adkins, Bidisha Lahiri, and Andreas Savvides

This paper examines the role of remittances in income diversication strategies in Bolivias rural sector. Remittances can be consumed or invested by the recipient. As an investment, funds can be used for farming or to nance other nonfarm income earning activities. In this paper we use a large and nationally representative survey to estimate the effect that remittances has on the probability of producing income from nonfarm activities (diversication) using a bivariate probit model. Our evidence shows that remittances increase the probability that a rural family engages in nonfarm activities. Moreover, households that receive remittances do tend to diversify more than those who do not, thus relaxing credit constraints commonly faced by rural farmers.

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