II Residential SUMMER SCHOOL

MODELLING ENERGY MARKETS USING STATA

Florence, 27-31 August 2018

The trend in deregulation in energy markets worldwide has resulted in significant volatility, both in terms of price and demand, in international energy markets. The modelling and forecasting of both demand and pricing has therefore become of utmost importance, not only to energy producers themselves, but to commodity traders and financial analysts focusing on the energy sector. Moreover, the specific nature of energy data itself, which tends to follow periodic patterns and exhibit non-constant means and variances, has resulted in the task of forecasting and modelling of energy data becoming somewhat challenging.

The objective of our "Modelling Energy Markets in Stata" Summer School is, to provide participants with the requisite toolset, both theoretical and applied, to enable them to correctly implement the appropriate statistical tools required for the modelling of both demand and prices in international energy markets. As such, the program has been developed to illustrate the range of available statistical tools currently available to researchers and practitioners, encompassing both: i) the more traditional univariate and multivariate time series regression approach to the modelling of price and demand in energy markets, focusing on the distributional properties, stationarity, seasonality and autocorrelated characteristics of energy time series data; and ii) univariate and multivariate GARCH models for the estimation and forecast of price volatility and risk management in energy markets.

Throughout the course of the week, theoretical sessions are reinforced by case study examples, in which the course tutors discuss current research issues, highlighting potential pitfalls and the advantages of individual techniques. The intuition behind the choice and implementation of a specific technique is of the utmost importance. In this manner, course leaders are able to bridge the often difficult gap between abstract theoretical methodologies, and the practical issues one encounters when dealing with real data.

The summer school opens with an optional one-day "Introduction to Stata" course to enable participants unfamiliar with the statistical software Stata to acquire the necessary introductory toolset to enable them to actively participate in the empirical sessions during the course of the week. The course covers everything from the very basics, in order to get one up and running in Stata, to an overview of the available Stata commands for preliminary data analysis, data management, importing and exporting data formats.

TARGET AUDIENCE

Researchers and professionals working either: i) on trading desks in financial institutions or ii) in the energy and related sectors, needing to model energy pricing. Economists based in financial institutions. Students and researchers in engineering, econometrics and finance needing to learn the statistical tools and methodologies applied in this field.

WORKSHOP CODE

I-SS12

DATE AND LOCATION

Florence, 27-31 August 2018
CISL Studium Center
Via Della Piazzola, 71
I-50123 Florence
http://www.centrostudi.cisl.it

COURSE REQUISITES

Introductory knowledge of econometrics and/or statistics.

MODELLING ENERGY MARKETS USING STATA

PROGRAM

MODULE A INTRODUCTION TO STATA

SESSION I: INTRODUCTION GETTING STARTED

1. Stata’s GUI
2. File types in Stata
3. Working interactively in Stata
4. Saving output: the log file
5. Interrupting Stata
6. Loading Stata databases
7. The Log Output File
8. Saving databases in Stata
9. Exiting the software

SESSION II: PRELIMINARY DATA ANALYSIS

1. A preliminary look at the data: *describe, summarize* commands
2. Abbreviations in Stata
3. Stata’s syntax
4. Summary statistics
5. Statistical Tables: *table, tabstat* and *tabulate* commands

SESSION III: DATA MANAGEMENT

1. Renaming variables
2. Selecting or eliminating variables
3. The *count* command
4. *sort* command
5. Creating sub-groups: the prefix *by*
6. Creating new variables: generate
7. Operators in Stata
8. The command *assert*
9. Missing values in Stata
10. Modifying variables: *replace, recode*
11. Creating Labels: variable labels and value labels
12. Creating dummy variables

SESSION IV: IMPORTING DATA FROM SPREADSHEETS

1. *Import Excel* and *Export Excel* commands
2. The *insheet* and *outsheet* commands
3. Reading in Text Data Files
4. Issues to watch out for when importing data
    - Missing values
    - String variables
    - Date variables
5. Redefining missing values
6. *destring* command
7. *tostring* command
8. dealing wih “messy” strings

MODULE B — THE ECONOMETRICS OF ENERGY MARKETS USING STATA

SESSION I: UNIVARIATE TIME SERIES MODELS FOR ENERGY PRICES AND DEMANDS (ELECTRICITY, CRUDE OIL, NATURAL GAS...)

1. Analysis the features of energy time series: seasonality, normality, stationarity and unit root tests, autocorrelation, heteroscedasticity, spikes
2. Application
   - Data analysis of energy time series in Stata
3. Univariate time series models for energy data (AR, MA, ARMA, ARIMA, ARFIMA, SARIMA)
4. Markov switching models for capturing stable and turbulent regimes in energy prices
5. Application
   - Estimating and forecasting energy prices and demands with univariate models in Stata

SESSION II: MULTIVARIATE MODELS FOR ENERGY PRICES AND DEMANDS (ELECTRICITY, CRUDE OIL, NATURAL GAS...)

1. Vector Autoregressive models to model interdependencies between stationary energy prices
2. Application
   - Fitting a VAR model with Stata
3. Cointegration theory. Autoregressive distributed lag models and error correction models. The Engle&Granger procedure and the Johansen's approach
4. Application
   - Cointegration techniques to model energy demand with Stata

MODULE C — FORECASTING ENERGY MARKETS VOLATILITY USING STATA

SESSION I: UNIVARIATE GARCH MODELS FOR ESTIMATING AND FORECASTING ENERGY PRICES VOLATILITY (ELECTRICITY, CRUDE OIL, NATURAL GAS):

1. Volatility definition and features
2. ARCH, GARCH, GARCH-in-mean and IGARCH models
3. Application
   - Analysing energy prices volatility and fitting ARCH and GARCH models with Stata
4. Inverse leverage effect in energy markets. Estimating asymmetric GARCH models (SAARCH, EGARCH, GJR, TGARCH, APARCH). News impact curve
5. Alternative GARCH specifications: Power ARCH, Non-linear GARCH models
6. Application
   - Testing for inverse leverage effect in energy markets and fitting asymmetric GARCH models with Stata

SESSION II: MULTIVARIATE GARCH MODELS FOR ENERGY PRICES VOLATILITY AND RISK MANAGEMENT TECHNIQUES

1. Diagonal VECH, Constant Conditional Correlation, Dynamic Conditional Correlation models.
2. Application
   - Testing for interdependencies between energy Markets using Stata
3. Value-at-Risk to measure market risk of energy markets. Parametric model, historical simulation, Monte Carlo simulation
4. Application
   - Value at Risk estimation of oil markets with Stata

MODELLING ENERGY MARKETS USING STATA

USEFUL TEXTS

Financial Econometrics Using Stata, Boffelli, S. e G. Urga (2016) Stata Press.

Introductory Econometrics for Finance, 3rd Edition, C. Brooks (2014) Cambridge University Press.

COURSE LEADERS

Una-Louise BELL, TStat S.r.l.
Elisabetta PELLINI, Cass Business School
Giovanni URGA, Cass Business School

REGISTRATION DEADLINE

Individuals interested in attending this summer school must return their completed registration forms either by email (training@tstat.eu) or by fax (+39 0864 206014) to TStat by the 6th of August 2018.

CONTACTS

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REGISTRATION FEES

PARTICIPATION FOR THE ENTIRE WEEK (Modules A, B and C – 5 days)
Students*: € 1090.00
Academic: € 1668.00
Non-Profit/Public Research Centres: € 1874.00
Commercial: € 2080.00

MODULES A and B (3 days)
Students*: € 789.00
Academic: € 1186.00
Non-Profit/Public Research Centres: € 1332.00
Commercial: € 1478.00

MODULE B or MODULE C (2 days each)
Students*: € 544.00
Academic: € 826.00
Non-Profit/Public Research Centres: € 922.00
Commercial: € 1018.00

*To be eligible for student prices, participants must provide proof of their full-time student status for the current academic year.

Fees are subject to VAT (applied at the current Italian rate of 22%). Under current EU fiscal regulations, VAT will not however applied to companies, Institutions or Universities providing a valid tax registration number.

Please note that a *non-refundable deposit* of €100.00 for students and €200.00 for Academic, Non-Profit/Public Research Centres and Commercial participants, is required to secure a place and is payable upon registration. The number of participants is limited to 15. Places will be allocated on a first come, first serve basis.

Course fees cover: teaching materials (copies of lecture slides, databases and Stata routines used during the school); a temporary licence of Stata valid for 30 days from the beginning of the school; half board accommodation (breakfast, lunch and coffee breaks) in a single room at CISL Studium Center (5 nights for entire week, 3 nights for Modules A and B, 2 nights for Module B or Module C). Participants requiring accommodation the night of the final day of the school, are requested to contact us as soon as possible.

To maximize the usefulness of this summer school, we strongly recommend that participants bring their own laptops with them, to enable them to actively participate in the empirical sessions.

Further details regarding our registration procedures, including our commercial terms and conditions, can be found at https://www.tstattraining.eu/training/modelling-energy-markets-using-stata/