

# Teaching Time Series analysis course using RcmdrPlugin.Econometrics

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## **Outline**

- Overview R for Time Series Analysis
- Overview RcmdrPlugin.Econometrics
- Examples and software demonstration

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## R-GUI

- Most Popular GUI: R-Commander (Fox, 2005)
- In general, R commander is a useful GUI for doing the most common use basic statistical analysis. However, it does not contain menus for econometric analysis (except for regression analysis).
- However, it can be easily extended using suitable plug-in (Fox, 2009).

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## R for Econometrics/Time Series Analysis

- For time series analysis, there are various packages of R, available under the taskviews Econometrics, Finance and Time Series in CRAN
- The main user interaction via Command Line Interface (CLI).
- See, for instance, Cryer and Chan (2008), Kleiber and Zeilis (2008), Pfaff (2008), Racine and Hyndman (2002), Vinod (2008) and Cribari-Neto and Zarkos (1999) for a comprehensive discussion of R application in Time Series and Econometrics modeling.

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## **R for Econometrics/Time Series Analysis (Cont'd)**

- For teaching purpose, R-CLI seems to be less user friendly and relatively difficult to use, especially if we compare it with the commercial softwares which has an extensive GUI capabilities, such as Eviews.
- Hodgess and Vobach (2008) introduced RcmdrPlugin.epack, a R-GUI package for doing time series analysis.
- In this talk, we introduce a new GUI package for time series analysis, called as RcmdrPlugin.Econometrics (Rosadi et al., 2009).

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## **Goals design and developments**

- Open Source and Multiplatforms
- The ease of use
- Comprehensive Input/Output dialog, Compatible with Commercial (or better??)
- Menu Coverage

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## Goals: Menu Coverage

Currently contain several menus:

- Simulation (of ARIMA and ARCH/GARCH models)
- Statistics (Numerical summary, Jarque Berra Statistics for normality test),
- Transformation (Box-Cox Transformation, Difference, Log Difference, Time Series conversion, ADF Test for stationarity),
- Plot (Time Series Plot and ACF/PACF plot)
- Univariate time series analysis (Smoothing, Decomposition, ARIMA, Automatic ARIMA, ARIMAX, ARCH/GARCH).

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## Goals: Menu Coverage (cont'd)

The 'to do list' for the future development of the plug-in,

- spectral analysis,
- multivariate time series analysis such as VAR and Cointegration analysis, Granger Causality, ECM and VECM, etc.; dynamic linear model (ADL)-> on going!!
- panel model
- and several other popular linear and non linear models

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The screenshot shows the R Commander interface. The 'Script Window' contains the following R code:

```
> ristetk <-
+ read.table("C:/Documents and Settings/Owner/My Documents/Info penetration dll/R
+ header=TRUE, sep
+ showData(ristetk, pl
+ maxheight=30)
```

The 'Econometrics' menu is open, showing options: Simulation, Statistics, Transformation, Correlogram Plot, Univariate TS Analysis (selected), Spectral Analysis, and Multivariate TS Analysis. The 'Output Window' is empty, and the 'Messages' window is also empty.

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The image shows two dialog boxes for configuring smoothing models. The top-left dialog is 'Exponential Smoothing' with the following settings:

- Smoothing method:  Single (1 param)
- Smoothing parameters: Alpha (mean) [E], Beta (trend) [E], Gamma (seasonal) [E]
- Estimation sample: 1970:01 1989:03
- Forecasts begin in period following estimation endpoint.
- Cycle for seasonal: 12

The top-right dialog is 'Seasonal HoltWinters Models' with the following settings:

- Enter name for model: HoltWintersModel.1
- Variable (pick one): SPAIN
- Seasonal Coefficients:  Additive,  Multiplicative

The bottom dialog is another 'Exponential Smoothing' window with the following settings:

- Smoothing Method:  Exponential Smoothing
- Variable (pick one): SPAIN
- Smoothed Parameter: Alpha (mean) <auto>, Beta (trend) <auto>, Gamma (seasonal) <auto>
- Enter name for smoothed series: <auto>
- Number of forecast: 6

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The image displays three dialog boxes from the R software interface, likely from the 'Rcmdr' package, used for specifying and estimating ARCH/GARCH models. The top-left dialog, 'Equation Specification', allows users to define the mean equation (here, 'return c') and select the ARCH model type (symmetric, asymmetric, etc.). The top-right dialog, 'ARCH/GARCH Estimation', provides options for the variable to be modeled ('DEUGBP'), the ARCH and GARCH orders (1 and 2 respectively), and the conditional distribution (normal, QMLE, student-t). The bottom dialog, 'GARCH Models', is used to specify the AR and MA orders for the underlying process (both set to 0).

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## What do Students say?

- Used it during Semester II, 2009/2010, in addition to Eviews
- Students are happy, they can focus on understanding time series models, not the computation
- It would be better if we have a text book specially designed for doing time series analysis using R and the Rcmdr plugins -  
 > I consider to write one, almost finish although still in Bahasa Indonesia

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## Empirical Examples

- Smoothing
- ARCH/GARCH

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Thank for Your attention!