

# DeducerHansel: Econometrics in R through a Graphical User Interface – by R. Scott Hacker

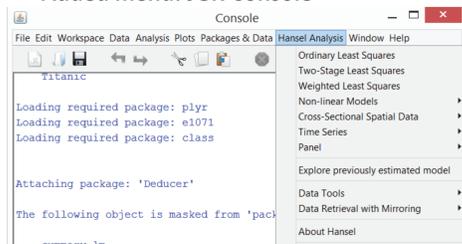
## The Tale of Hansel after gretl

Upon a time there was a big powerful forest in the lands of Statistica called **R**. It was free and open to all, but difficult for many commoners to find their way through. Then came **gretl**, who extracted some of the powers of that forest and put them into her own open-and-free forest, making it easier for many to make it through that new forest—especially those of the House Economica. Her brother **Hansel**, however, wanted to make it easier for the commoners to make their way through the original **R** forest. That's what he did, with the help of a wise wizard known as **Deducer**, and that is where the real story begins...

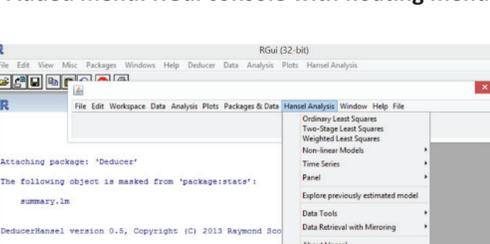
The story synopsis: **DeducerHansel** (created by R. Scott Hacker) has been developed to be an open-source add-on to the currently existing **R** package **Deducer** (by Ian Fellows) on CRAN to provide a nice graphical user interface for access to many statistical functions in **R**, especially those that would be of interest to economists. **Deducer** and **DeducerHansel** are both written in **Java** (with some **R** code included) so both are available across multiple platforms, and both work with the base **RGui** console and with the **Java**-based console **JGR** (also available as an **R** package). The software **gretl** (Allin Cottrell, Riccardo "Jack" Lucchetti) is written in **C** by econometricians, for econometricians, providing nice graphical user interface for many statistical functions that would interest economists. The software **gretl** and its scripting language **hansl** are independent of **DeducerHansel**.

The **DeducerHansel** package adds a "Hansel Analysis" menu to the **JGR** console and to the standard **RGui** console. With the **RGui** console, a "floating menu" option is available which allows submenus and smoother operation.

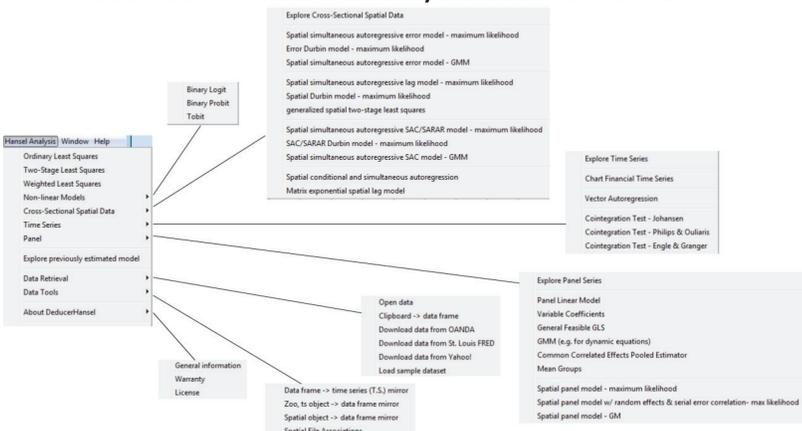
### Added menu: JGR Console



### Added menu: RGui console with floating menu



Below is shown what is currently available in the submenus:



## Hansel's Tale with Linear Models

As with the base **Deducer** package, **DeducerHansel** can deal with estimates using the **lm()** or **glm()** function. **DeducerHansel**, however, provides more plot options and diagnostic tests. It also offers a "nice" presentation of estimation results in html format along with the "classic" **R** estimation output. It includes a "Commands Log" that saves **R** commands that result in estimation or plot output, so **DeducerHansel** helps newcomers to learn **R** code. Hansel allows users to save objects with estimation results, e.g. objects of class "lm" and "glm", and view them later with the **gui** interface. Such objects may be even generated outside of **DeducerHansel**!

Below is an example of what can be done in **DeducerHansel** with ordinary least squares estimation using the **Anscombe** data frame from the **car** package (by John Fox, Sanford Weisberg, and others). This is data on public-school expenditures for US states plus Washington DC in 1970, with the variables being education (per-capita education expenditure, dollars), income (per-capita income, dollars), young (proportion under 18, per 1000) and urban (proportion urban, per 1000).

## Hansel's Tale Continues with Univariate Time Series Data...

The base **Deducer** package currently cannot deal with time series objects that have a class of "ts", "zoo", "xts", or "mts", but with the **Hansel** extension it can! Below is an example of what can be done using the **UKPPPPII** data frame from Bernard Pfaff's **urca** package. The **UKPPPPII** data frame consists of 1971:Q1 – 1987:Q2 quarterly data with all variables in logs. The screenshots below use data on the UK effective exchange rate,  $i_1$  (three-month Treasury bill rate in the UK), prior to generating the examples shown below **DeducerHansel** was used to help create a "zoo"-class object based on the **Upppuip** data frame along with a starting date and frequency. **DeducerHansel** keeps track that that new object and its association with the **UKPPPPII** data frame. The **correlograms** use the **acf()** function from the **stats** package by the R Core Team, the moving average comes from using the **ma()** function from the **forecast** package by Rob J Hyndman (with contributions from various others), and the augmented Dickey-Fuller unit root test results use the **ur()** function from the **urca** package by Bernard Pfaff and Matthieu Stigter.

## Hansel's Tale Continues with Multivariate Time Series Data...

**DeducerHansel** can even deal with multivariate time series analysis! Below is an example of what can be done using the **UKPPPPII** data frame from Bernard Pfaff's **urca** package. The **UKPPPPII** data frame consists of 1971:Q1 – 1987:Q2 quarterly data with the variables, all in logs, the first five being  $p_1$  (UK wholesale price index),  $p_2$  (trade weighted foreign wholesale price index), UK effective exchange rate,  $i_1$  (three-month Treasury bill rate in the UK),  $i_2$  (Three-month eurodollar interest rate). Prior to the examples shown below **DeducerHansel** was used to help create a "zoo"-class object based on the **Upppuip** data frame along with a starting date and frequency. **Hansel** keeps track that that new object and its association with the **UKPPPPII** data frame. The two figures in the first column below show how **DeducerHansel** allows one to visualize the raw time series data, while the other figures show what can be done with Johansen-based cointegration estimation, using the **ca()** function from Bernard Pfaff's **urca** package.

## Hansel's Tale Continues with Panel Data...

**DeducerHansel** can handle panel data analysis. Below are examples of what can be done using the **Grunfeld** data frame from the **plm** package, provided by Yves Croissant, Giovanni Millo, Arne Henningsen, Ott Toomet, Christian Kleiber, and Achim Zeileis. The **Grunfeld** data frame consists of 1935-1954 data on 10 US firms regarding gross investment (*inv*), value of the firm (*value*), and capital stock of plant and equipment (*capital*), along with a firm identification number (*firm*) and year. The first two figures show how **DeducerHansel** allows one to visualize the raw panel data, while the third figure shows what can be done with panel regression estimation, and the fourth shows available diagnostic tests. The panel estimation shown uses the **plm()** function from the **plm** package.

## Hansel's Tale Continues with Spatial Data...

**DeducerHansel** even provides possibilities to work with spatial data. Below are examples of what can be done using the **sids** shape file from Roger Bivand's **spmatools** package and the **Produc** data frame from the **Ecdat** package along with the **usaww** matrix from **splm** package by Giovanni Millo and Giofranco Piras. The **sids** shape file provides information on sudden infant death syndrome for the various counties in North Carolina. The examples focus on this information for 1979-1984 (**SID79**) and births in the same years (**BIR79**). The **Produc** data frame (from the **plm** package) provides information on US state production for 48 states, 1970-1986, with the example focusing on the variables **gsp** (gross state product), **pcap** (private capital stock), **pc** (public capital), **emp** (employment in non-agricultural payrolls), **unemp** (the state's unemployment rate), and the **usaww** matrix (from the **splm** package) – a matrix of spatial weights for the 48 continental US states using the criterion of queen contiguity. The first 2 figures show how **DeducerHansel** allows one to visualize the raw panel data, the middle 2 figures demonstrate what can be done with a cross-sectional regression estimation (in this case a spatial simultaneous autoregressive error model), and the last figure show what can be done using spatial panel regression estimation. The Moran plot and the cross-sectional panel estimation shown respectively use the **moran.plot()** and **errorsarlm()** functions from Roger Bivand's **spdep** package, while the map uses the **spplot()** function from the **sp** package. The spatial panel regression uses the **spml()** function from the **spml** package.

### Poster Presentation for the user!2017 Conference (July 5 - July 7) in Brussels

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The DeducerHansel package is available at Github through <http://rscottgh.github.io/DeducerHansel/>.  
 For more screenshots, check out <http://hasc57.wikisite.com/econometrics-r-gui>.

