Givewin 2 and PcGive 10:
A Brief Introduction to the Computer Program

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Introduction

This document introduces students to the interactive econometrics computer program Givewin 2 and PcGive10 for Windows, written by Doornik and Hendry. For more details on various aspects of the program users are directed towards the very comprehensible reference manual "PcGive 10.0: An Interactive Econometric Modelling System" (by J. A. Doornik and D. F. Hendry publisher Thomson) and the on-line help system.

Givewin 2 and PcGive10 are windows based program and are on the Warwick network in the Econometrics folder. From this folder select the Givewin 2 folder. To have access to the program it is first necessary to initialise the program. Initialisation is done by double clicking on the Givewin icon and then double clicking on the PcGive10 icon.

Givewin and PcGive work in conjunction. Givewin is concerned with data loading, data management and graphing for use by PcGive, it also has the **Results windows** where output from PcGive10 goes; and PcGive10 which is concerned with the formulation and estimation and testing of regression models.

PcGive offers a range of estimation packages: (i) Econometric modelling, (ii) Limited dependent variable models, (iii) Panel data models, (iv) Volatility models and (v) Time series models.

1. GiveWin

Having entered the program the user is faced with the main window (Figure 1).

Figure 1: Start-up screen for Givewin and PcGive
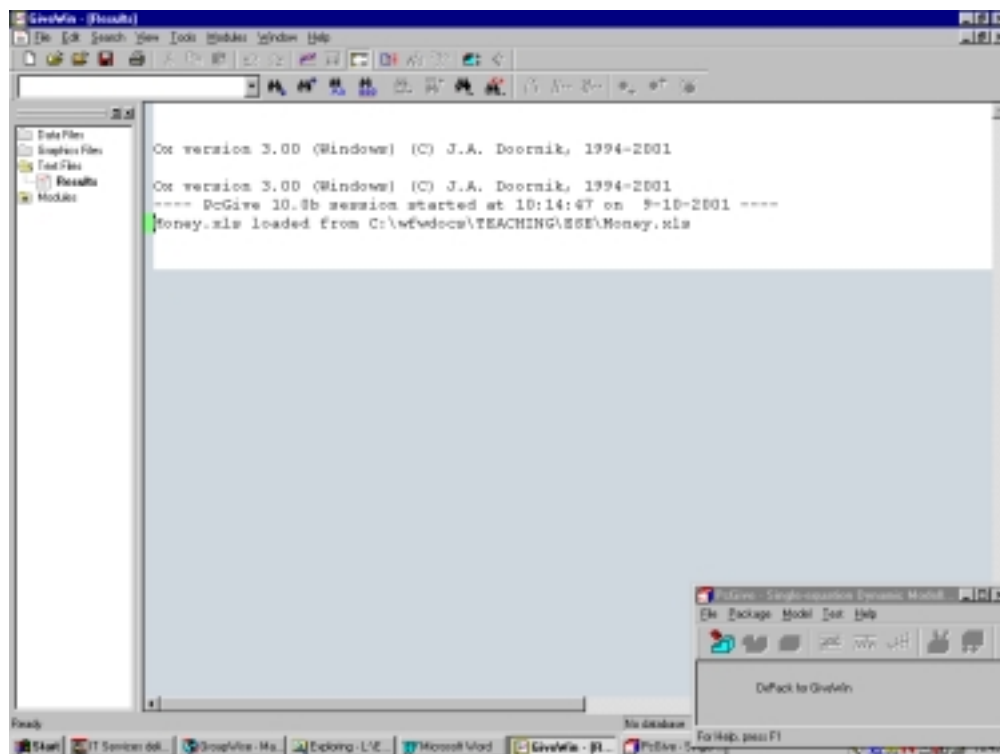
The screen contains a series of drag down menus and icons, which enable the user to move from reading in data, to undertaking data transformations, to graphing data and the editing of output. This main screen contains a series of keywords (with highlighted letters) at the top of the screen (which can be activated either using Alt+highlighted key or using the mouse) and a small number of icons for selected operations. The main part of the screen is split; on the left part of the screen is a there is a directory of the files you have open within Givewin. The package distinguishes between data files, graphic files and test (result) files. The right portion of the screen shows the appropriate data file, graphic file or text file. In Figure 1 the results file can be seen. The **Results Window** is very important for your work, as all the results generated during your session on PcGive10 will be recorded into this window. At the end of your session (and before you exit) it is important to save the results, graphs and data files, otherwise they will be **lost** when you exit the program.

## 1.1 Opening existing data files

You can read data into Givewin in a variety of different data formats. The formats which Givewin recognises are: (a) PcGive files (*.in7), (b) human readable (ascii) data files (*.dat) (with or without load information), (c) excel 4.0 (or earlier) worksheets (*.xls), (d) Quattro Pro (or Lotus) (*.wk?), (e) gauss datafiles (*.dht), or (f) stata 6.0 (or earlier) datafiles (*.dta).

[**NOTE**: It may be the case that you will have to use StatTransfer in order to convert your data into a suitable format to be read by Givewin].

In order to read in your data file you choose:

File and Open (Ctrl+O) (or Alt+F and Alt+O, or [icon]). You then get figure 2:

Figure 2: Listing of data files to be read by Givewin
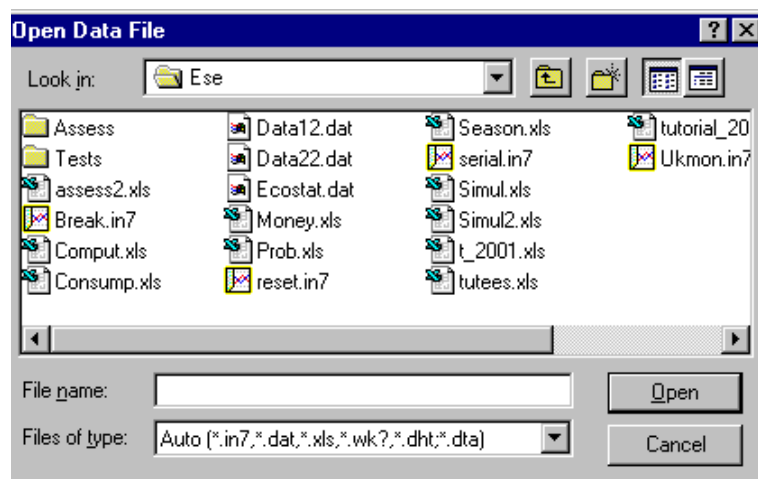

To select a file use the Look in: box to choose the appropriate Drive (invariably h:) and the Directory and then select one of the readable file types (a) to (f) above.
[NOTE: a number of data files can be open at any one time].

Having loaded your data file, for example, money.xls, you get a data file icon for money.xls and on double clicking this icon you get Figure 3.

[NOTE: For all data file types with the exception of ascii (human readable) (*.dat) files you will not actually have to supply any other information regarding the data set].

Figure 3: Givewin spreadsheet for money.xls
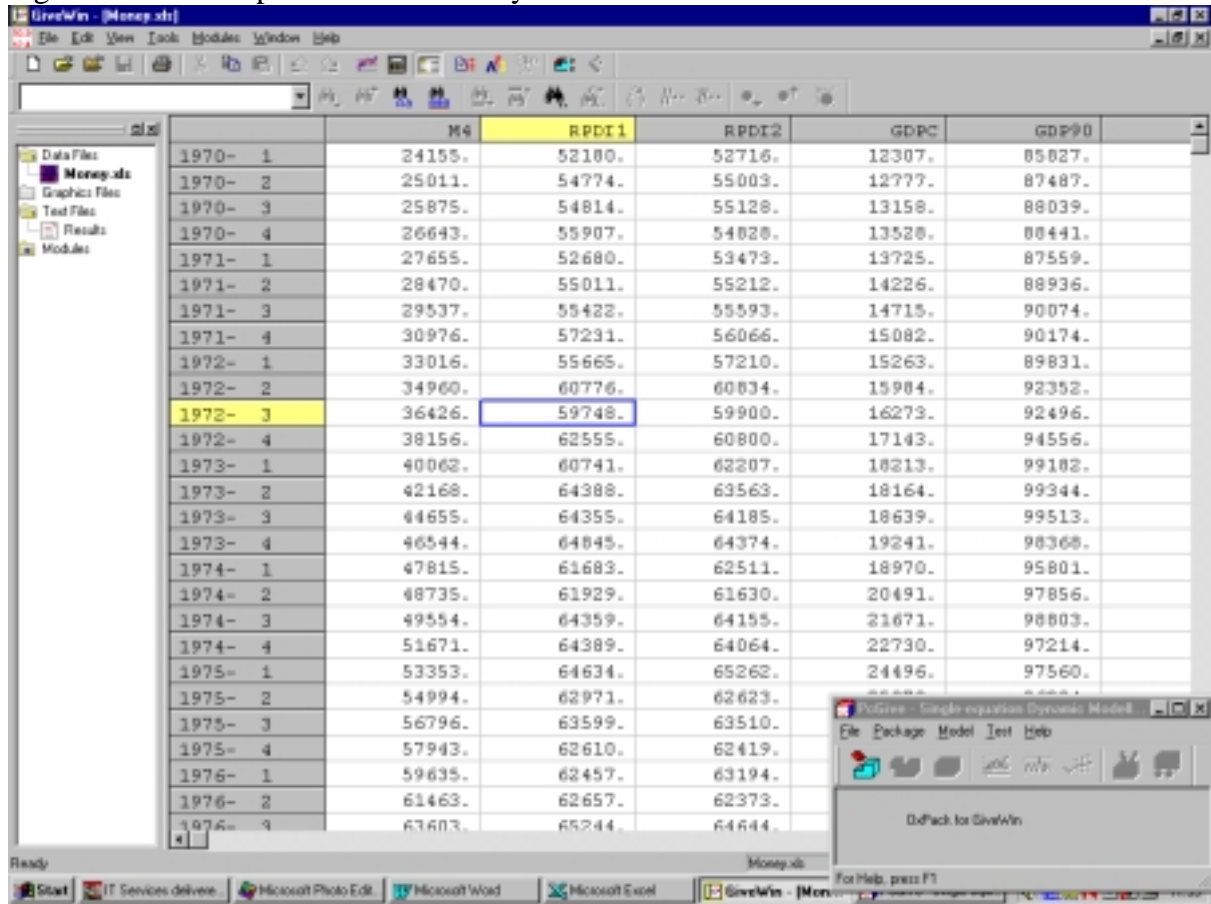
This is a basic spreadsheet with each individual series in separate columns and variable labels are in the first row. In this database we have broad money (M4), two measures of real personal disposable income (RPDI1 and RPDI2) nominal GDP (GDPC) and real GDP (GDP90). The data is quarterly and runs from 1970Q1 to 1996Q4. The excel worksheet from which this was read would look like Figure 4.

Figure 4: Excel spreadsheet of money.xls

	A	B	C	D	E
1		M4	RPDI1	RPDI2	GDPC
2	1970-1	24155	52180	52716	12307
3	1970-2	25011	54774	55003	12777
4	1970-3	25875	54814	55128	13158
5	1970-4	26643	55907	54828	13528
6	1971-1	27655	52680	53473	13725

For this dataset the first column of the excel spreadsheet had the dates and no variable label. If the dates were not provided PcGive would have dated the series as 1-1 to 108-1. As many datasets can be open simultaneously it is possible to move data from one spreadsheet to another using the copy and paste (or cut and paste) options. To change a number within the spreadsheet

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click on the number with the mouse and press return – you can then type in the correct number. Missing numbers are represented by the word *missing*.

If the data is human readable (ascii) (*.dat) you can either (i) supply in details regarding the data file within the program (see Figure 5). This asks about: the frequency of data, the sample dates, the number of variables and the format of the data (either ordered by variable or by observation – Figure 4 is an example of data organised by observation). In this case the ascii data file must contain only numbers with no variable labels, or (ii) include the information as part of the data file, see http://www.warwick.ac.uk/economics/ug/ec306/notes/wages.dat as an example of such a file.

Figure 5: Data information for ascii data

To write in new names double click on the variable title in the spreadsheet (in Figure 3) and you get figure 6

Figure 6: Variable description box

1.2 Create a new data set in Givewin

To enter data by hand in PcGive click on
File and New (Ctrl+N) (or Alt+F and Alt+N), this enables the opening up of a new database,
Results window or graphics file. On clicking on Database you are faced with the screen (Figure 7)

Figure 7: To create an new database

Having selected Database you must supply Givewin with some basic information about the nature of the data (see Figure 8).
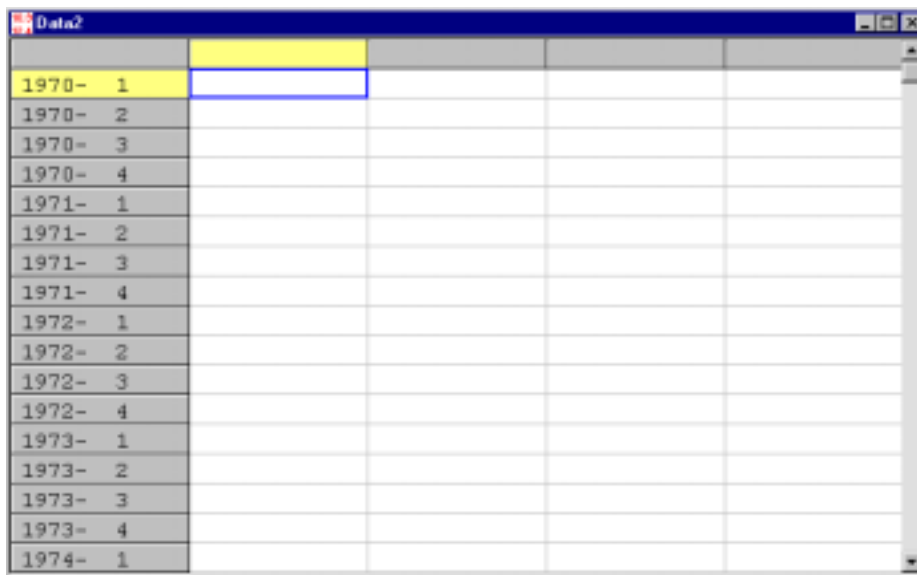
Figure 8: Database details
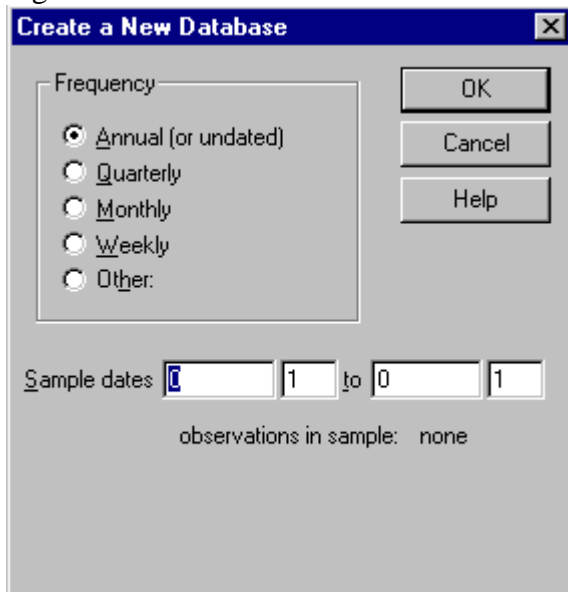
Having filled in the details, for example, Quarterly 1970-1 to 1990-4, you are presented with an empty spreadsheet (see Figure 9) in which you must enter all variable names and values.

[Note: The variable names are CASE SENSITIVE so beware.]

Figure 9: Empty Givewin spreadsheet

1.3 Options in Givewin
1.3.1 File
Clicking on File (Alt+F) gives the options

These options enables us to read in data file, graphic files and results files as well as saving data files, graphic files and results files. Data files can be saved as Givewin data files (*.in7), Excel 2.1 worksheet files, Lotus {1-2-3} WKS files (*.wks), ascii data files (by variable, by observation and with load information). Graphics files can be saved as (Enhanced metafile (*.emf), Encapsulated postscript (*.eps), Fullpage postscript (*.ps) and Givewin graphics files (*.gwg).[1] Results files are ascii based and are usually written as *.out files. Within File you can also control printing. The important options (in relation to reading in data) of this option have

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[1] Graphs can be directly cut and pasted between Givewin and Word. However, to incorporate a Givewin graphics file into word it is best to save files as either *.emf or *.eps files. Givewin can ONLY read back files saved as gwg files.

been discussed above. Other options within File are very similar to those in other windows programs.

1.3.2 Edit

Clicking on Edit (Alt+E)

Undo	Ctrl+Z
Redo	Ctrl+Y
Cut	Ctrl+X
Copy	Ctrl+C
Copy History	
Paste	Ctrl+V
Paste as Column	Ctrl+M
Delete	Del
Select All	
Run as Batch	Ctrl+B
Run as Algebra	Ctrl+A
Run as Command	Ctrl+I
Command Wizard	Ctrl+W

These options are concerned with the editing (copying, cutting, pasting and deleting) of the results file are very similar to those available in other windows programs and will not be discussed here. Techniques for moving around the results file (Page up, Page down, End and Home) are also fairly standard.

1.3.3 Search

Clicking on Search (ALT+S)

Find...	Ctrl+F
Find Next	F3
Replace...	Ctrl+H
Go To Line...	
Go To Next Marker	
Go To Previous Marker	
Match Bracket	

Again use of these options should be fairly familiar to most users.
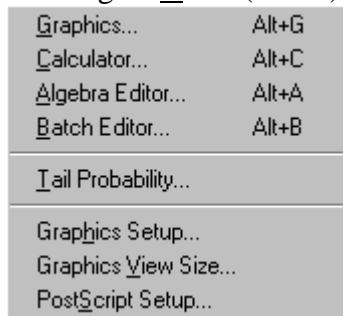
1.3.4 View

Clicking on View (Alt+V)

Line Numbers	
Set Marker	
Clear Marker	
Clear All Markers	
Tool Bars	▶
Preferences	▶

These options control the appearance of the GiveWin program and invariably will not be altered.

1.3.5 Tools
Clicking on Tools (Alt+T)

|	
Graphics...	Alt+G
Calculator...	Alt+C
Algebra Editor...	Alt+A
Batch Editor...	Alt+B
Tail Probability...	
Graphics Setup...	
Graphics View Size...	
PostScript Setup...	

Has a number of important options for transforming data as well as graphing data and these will be discussed in turn.

1.4 Graphing in Givewin

Graphics (Alt+G) or click on the icon

There is great flexibility in the graphing capabilities in this program, a feature much improved from what was available in PcGive 9.0. Having selected graphics you will be presented with Figure 10

Figure 10: Basic graphing options
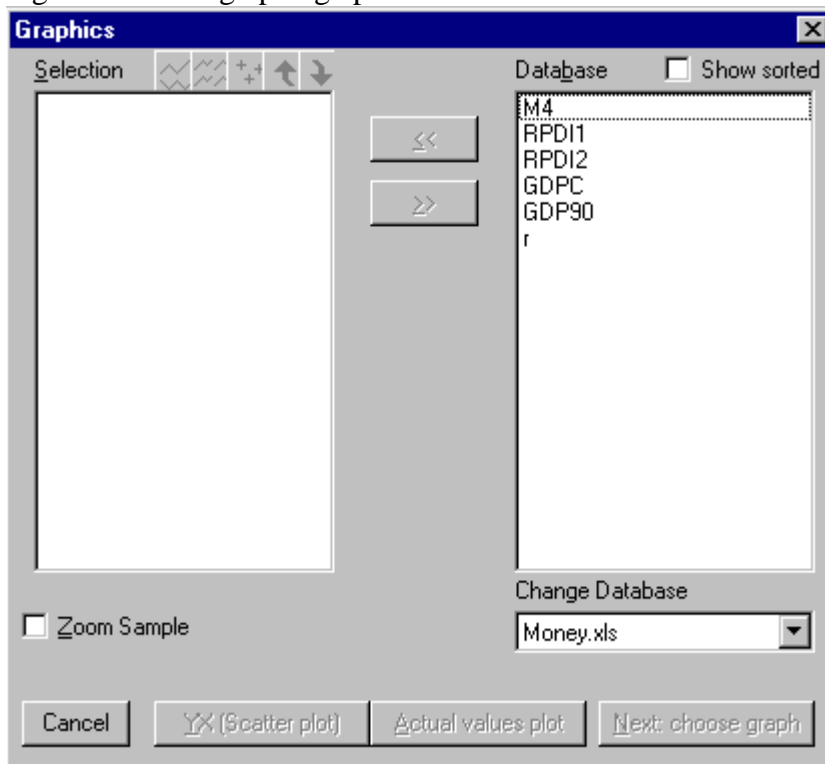
To plot individual series move the appropriate series from right hand box (Database) to the left hand box (Selection) using the arrow button <<. Having chosen your variables the plotting icons above the selection box become highlighted. Above the selection box there are three basic options for plotting, although other options can be accessed by choosing Next: choose graph:

 Apply actual values plot (all series are plotted on the same graph),

 Apply separate actual values plot (each series is plotted on a separate graph),

 Apply YX scatter plot (Y is the first series and there can be a number of X series).

The up and down arrows along side the plotting icons allow you to re-order the variables in the Selection box. Figure 11 is an example of a figure generated from plotting both M4 and RPDI1 on separate graphs, on the same graph, and as a cross-plot.

Figure 11: A plot of M4 and RPDI
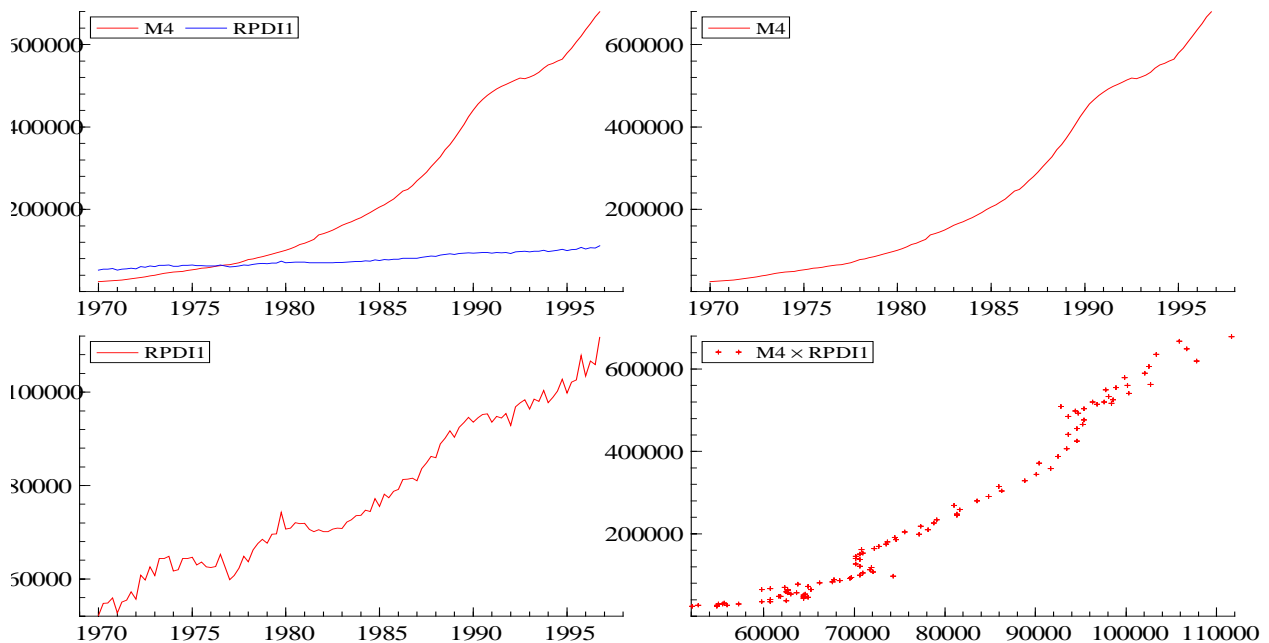
[NOTE: Up to 36 graphs can fit on 1 page and you can always add to existing plots. However you MUST save all graphs you want to keep, as Givewin only allows 1 unnamed graph in memory].
Highlight a graph, by using the left button of the mouse. Now right click the mouse on the highlighted graph and you have the option of modifying the graph. The options available are in Figure 12.

Figure 12: Options available from right clicking the mouse on any highlighted graph
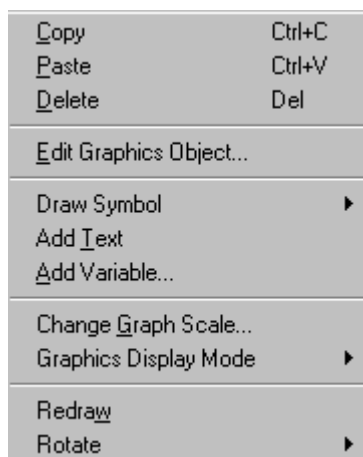
Selecting the option Edit Graphics Object… you get figure 13, which gives you options for changing the appearance of your graph.

Figure 13: Options from selecting Edit Graphics Object from Figure 12
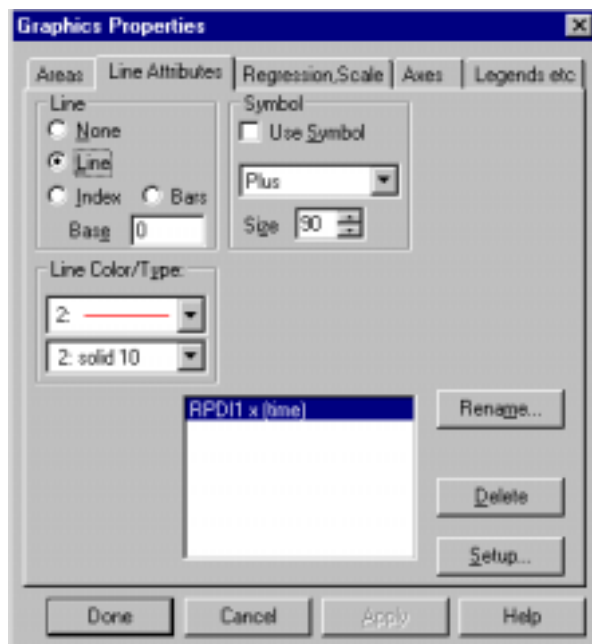
This option allows you to modify how your graph actually appears. You can modify line colours, the axes, the legends and the area of the plot as well as add new series to the graph. In addition, by selecting Regression, Scale you can modify the units of measurements of one or more series such that when you plot 2 series on the same axis you are still able to see the movements of both series.

In addition, to the 3 graph types noted above there are a huge range of alternate types of plotting capabilities available, clicking on Next: choose graph in Figure 14 you get

Figure 14: Alternative plots available in Givewin.
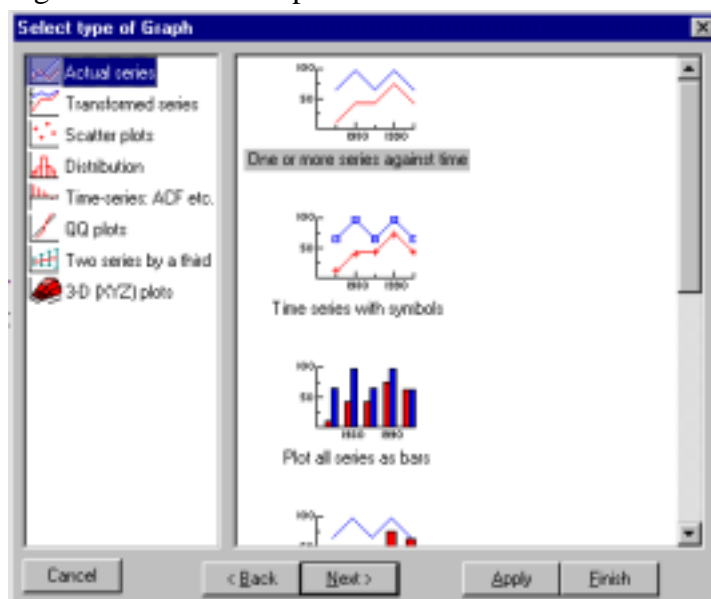
1.5 Data transformations in Givewin
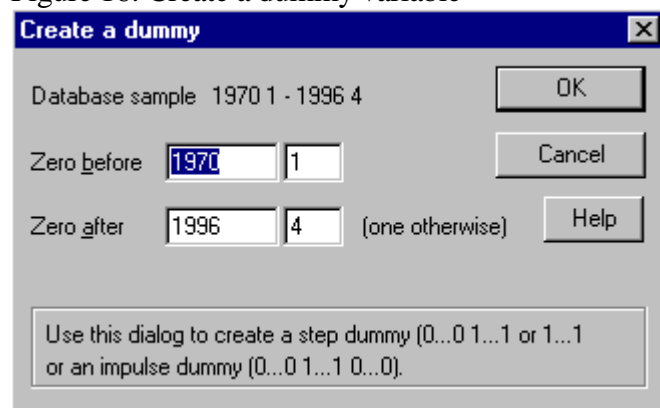## 1.5.1 Calculator

Clicking on Calculator (ALT+C or [calculator icon]) loads the calculator window (see Figure 15). This is the option for undertaking data transformations. To do one of the basic transformations log, (or lag, exp, diff, dlog or dummy), click on the variable you wish to transform and the click on the transformation. The operation to be done will now be written in the top box which might read log(M4) (or Diff(M4), lag(M4,1)). Click on the = key to evaluate the expression, you are now asked to supply the Destination Name, the program suggests LM4 (or DM4, M4_1), you can either accept this or change it. The calculator can add two variables (+), subtract two variables (-), multiple two variables (*), divide two variables (/), take a power (^). More complicated transformations are available in the functions box.

Figure 15: Calculator window for basic data transformations
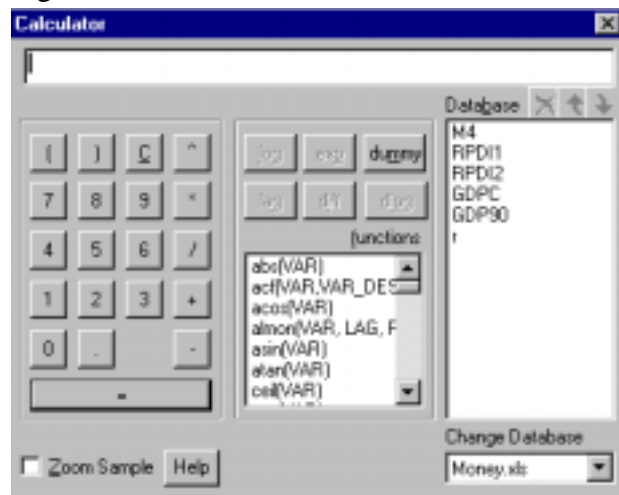
Clicking on dummy option gives you Figure 16. To input an impulse dummy variable in 1973Q1 requires you to put 1973 1 in the Zero before box and 1973 1 in the Zero after box.

Figure 16: Create a dummy variable

1.5.2 Algebra

Clicking on <u>A</u>lgebra (ALT+A or) loads the algebra window (see Figure 17). As an alternative to using the calculator to generate new series, it is possible to use the algebra window. In this case, you actually write out the transformations you want GiveWin to undertake explicitly. There are a series of functions, which you can scroll through in the function box. Having written the transformations you want, you can execute the transformations by clicking on OK:run. You can save these transformations to a file using save or load previously saved transformations. Remember all commands must end with a semi-colon. Figure 12 generates some basic transformations of our series.

Figure 17: Algebra window
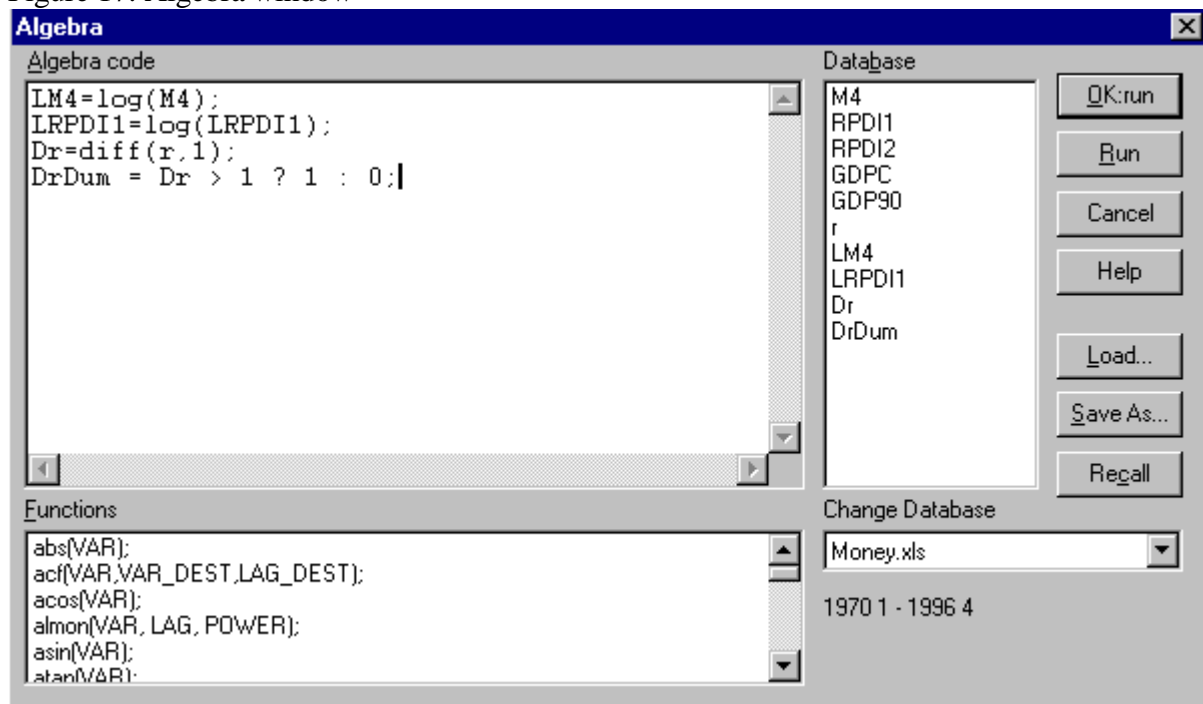
Note 1: The last command creates a dummy variable called DrDum and the expression should be read as:

if(Dr>1) then DrDum=1 else DrDum=0.

In the function between = and ? is the **if** part, between ? and : is the **then** part and between : and ; is the **else** part.

The command:

rDum = r ==6 ? 1 : 0 ;

creates a dummy variable rDum=1 if(r=6) and 0 otherwise.

Note 2: The computer can generate random numbers from normal (rannormal()), t (rant(df)), χ^2 (ranchi(df)) and F (ranf(df1,df2)) distributions using the ran function, where the numbers in parentheses are the degrees of freedom. You can set the random number seed using ranseed(no);

Note 3: ranseed(-1) uses the default value

1.6 p-value calculations in Givewin

Clicking on <u>T</u>ail probability calculates the probability of observing a number as big as the one supplied for one of the specified distributions (F(n1,n2), t(n1), chi^2(n1) and N(0,1) and values for n1 and n2).

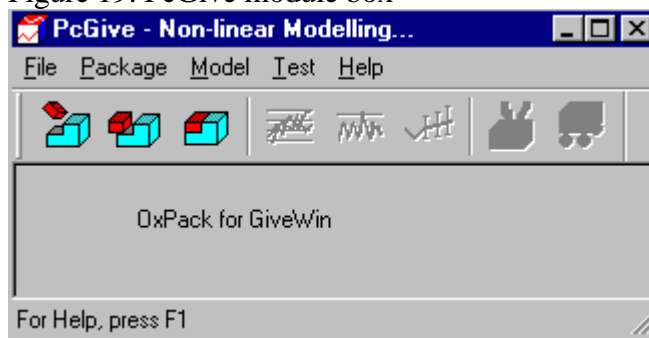Figure 18: Calculating tail probabilities
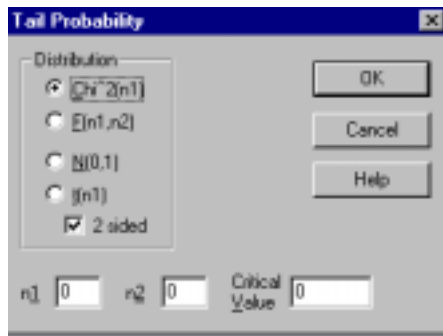
Most of the other options are used primarily to control the quality of output or the presentation of the windows.

2 PcGive

The PcGive module appears in Figure 19

Figure 19: PcGive module box

The Eile option enables the PcGive box to be Always on top or to Exit the program.

Clicking on Packages gives Figure 20, which has 5 alternative estimation packages. In this handout we will only discuss Econometric Modelling (PcGive) the other packages are discussed in the handout **PcGive (other estimation packages)**.

Figure 20: Alternative estimation packages available in PcGive
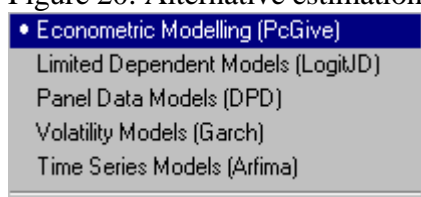
Choosing Econometric Modelling (PcGive) (the default) and clicking on Model you have the options listed, in Figure 21 and these will be discussed in turn .The modelling option 4: Multiple-equation Dynamic Modelling…, is discussed in the handout **PcGive (Multiple-equation Dynamic Modelling)**.

Figure 21: Modelling options in Econometric Modelling (PcGive)
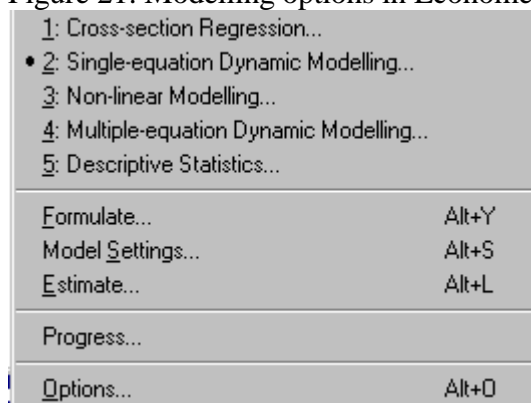

2.1 Descriptive Statistics…

Selecting Descriptive Statistics… you are presented with Figure 22 which lists the variables in your Database and requires you to select the variables you wish to analyse.

Figure 22: Variables for descriptive statistics

Selecting any subset (including lags of the variables) of the variables (variables are selected by using the control key and the left button on the mouse) and clicking OK gives Figure 23. You now select the type of descriptive statistics you want. You can obtain basic summary statistics (mean, variance and correlation between two or more series) perform normality tests (including measures of skewness and kurtosis), and Augmented Dickey-Fuller (ADF) unit root tests. For the ADF tests you specify the nuisance parameters, that is, whether there is a constant, or a constant and trend and/or seasonal parameters, and the lag length. Select sample enables the sample size to be changed, the default is to use all available (contiguous) observations.

Figure 23: Descriptive statistics options
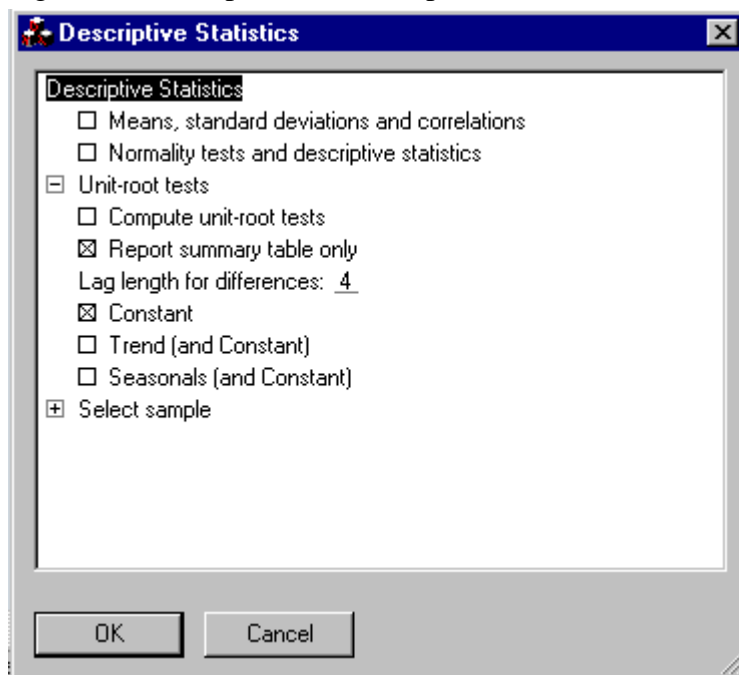
2.2 Single-equation Dynamic Modelling
2.2.1 Formulation

Selecting this option gives you Figure 24. You are given a list of variables in the database and are required to specify the model you wish to estimate. In the bottom right hand corner you must select the lag length to be used in your models (a different lag length can be selected for each variable). Having chosen the lag length (I selected zero – see Figure 25) you then double click variables in the Database list and they along with the specified number of lags move to the Model column. Lagged variable is denoted with an underscore, such that $M4_{t-1}$ and $M4_{t-2}$ are denoted as M4_1, M4_2. The lag length can be different for different variables – this can be achieved by selecting Lag length query option.

Additional variables denoted in the Special column can also be used. These can be included in the Model by double clicking on the appropriate variable (or by highlighting the variable in the Database box and clicking <<Add (button in the top right hand corner which replaces OK when a variable is highlighted). By default a *Constant* (intercept) is included in all regression models. *Seasonal* are seasonal dummy variables for quarterly data these will be three seasonal dummy variables. Seasonal (indicates quarter 1 dummy), Seasonal_1 (indicates a quarter 2 dummy) and Seasonal_2 (indicates a quarter 3 dummy). *Trend* is a simple counter variable.
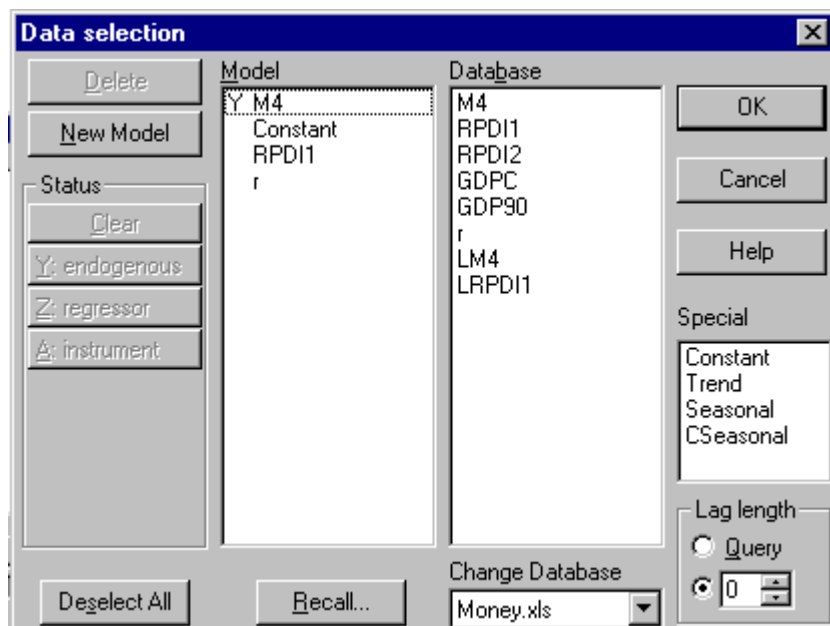
Figure 24: Model formulation box
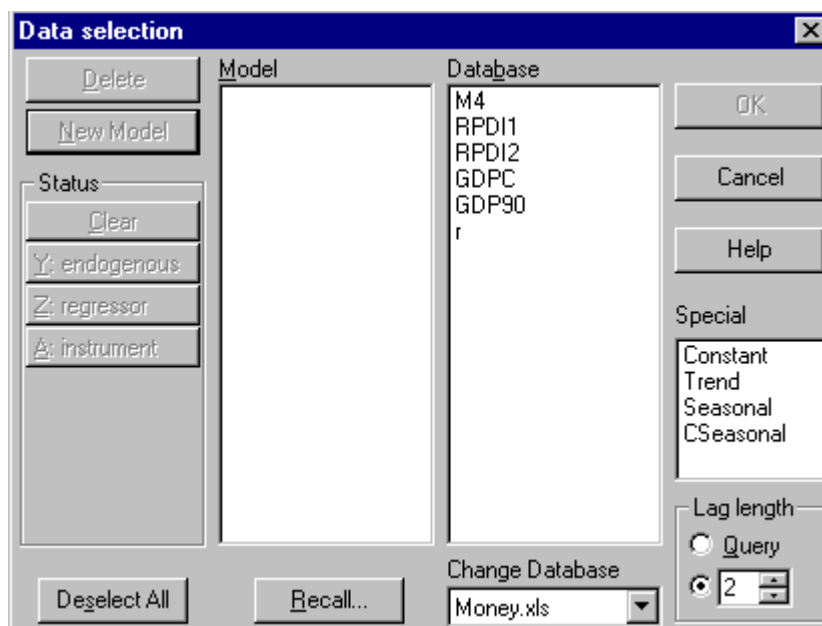
From the Database suppose you wish to estimate the model:
$$M4_t = \alpha + \beta_1 RPDI1_t + \beta_2 r_1 + \varepsilon_t$$

Having specified the model you want click OK and get Figure 25. [Note: If you wanted the 1st and 4th lags of a variable called r, you choose lag length 4 for this variable, then highlight r_2 and r_3 in the Model box and click the Delete button]. The endogenous variable (marked Y) will automatically be the one at the top of the list of variable. To change the status of the variables (and make a variable further down the list into the endogenous variable), highlight LM4 and click on Z: regressor and then highlight, for example, RPDI1 and click on Y: endogenous. RPDI1 will now be marked Y.

Figure 25: Model formulation box

2.2.2 Model settings
Clicking OK gives the Model Settings box (see Figure 26) where you choose the method of estimation (the default is Ordinary Least Squares). For Instrumental Variable (IV) estimation the model formulation (Figure 25) will have at least two endogenous variables. The top one will be the left-hand side endogenous variable and the subsequent variable(s) will be the endogenous RHS variables. For IV you also have to tell the computer in Figure 25, what the exogenous variables and the instruments are in the model. Select **at least** one instrument for each RHS endogenous variable you have (although you can obviously choose more).

Figure 26: Estimation method
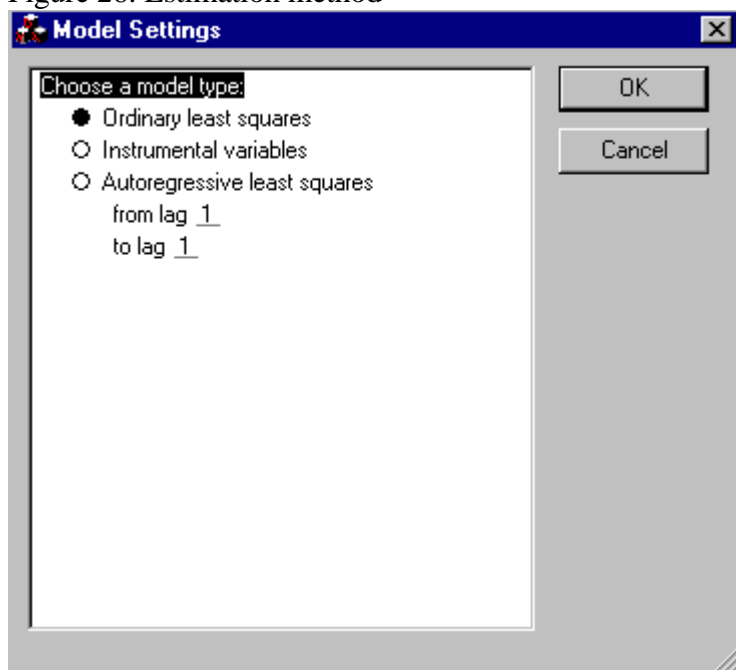
Clicking on OK you get Figure 27, in which you select the sample period.

2.2.3 Estimation

The maximum sample period available is written as Selection sample and in Estimation sample you select a sub-sample if it is desired. If you wish to do forecasting you must specify the number of period over which you wish to forecast. If you wish to do recursive estimation you must select this option and specify the number of initial observations you require the computer to use for the first sub-period.

Figure 27: Estimation sample period
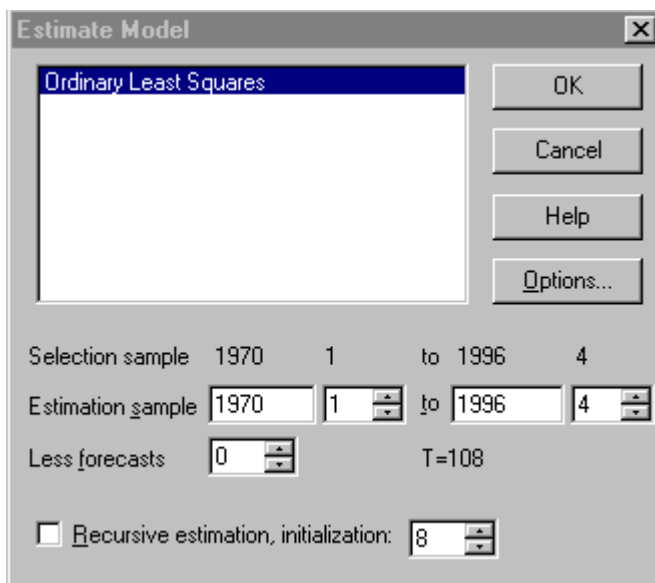
The output then looks like this:

```
EQ( 1) Modelling M4 by OLS (using Money.xls)
      The estimation sample is: 1970 (1) to 1996 (4)
            Coefficient  Std.Error  t-value  t-prob Part.R^2
Constant          -652680. 2.113e+004    -30.9   0.000   0.9017
RPDI1              12.2555     0.2138     57.3   0.000   0.9693
r                -6954.75      971.0    -7.16   0.000   0.3303
sigma             32133.6  RSS          1.07387383e+011
log-likelihood   -1260.71  DW                        0.712
no. of observations    108  no. of parameters           3
mean(M4)           245672  var(M4)          4.10932e+010
```
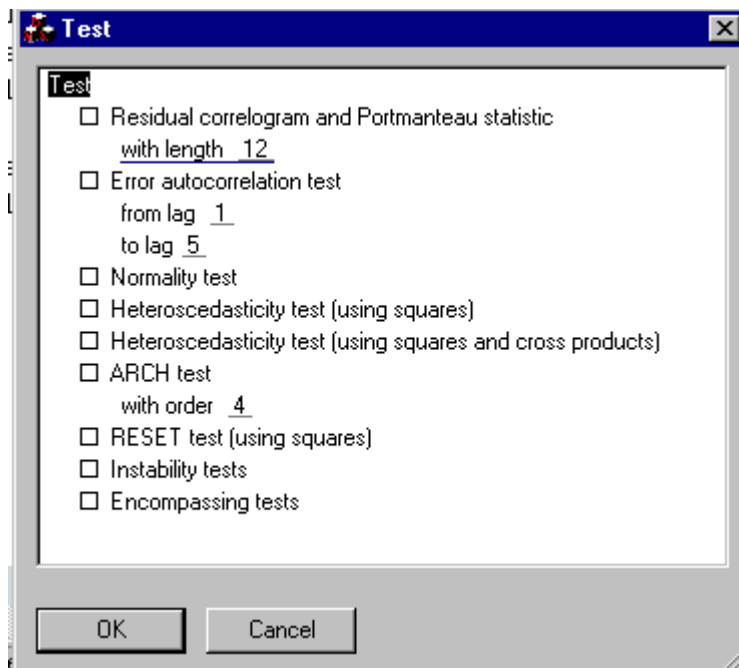
2.3 Testing
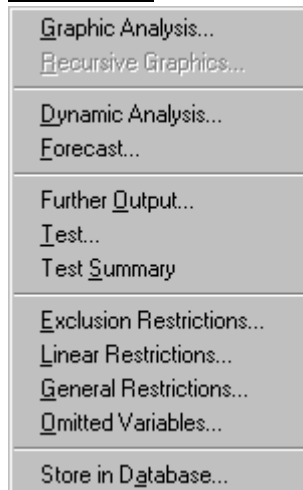
This option offers an evaluation of the regression equation just estimated.

2.3.1 Diagnostic Testing

Selecting the option Test you get Figure 28, which allows you to determine the nature of the diagnostic tests that you are going to do on the model by checking the appropriate boxes:

Figure 28: Diagnostic test options

Clicking Test Summary gives a series of 6 pre-defined diagnostic tests of your model

```
AR 1-5 test:      F(5,99)  =   23.585 [0.0000]**
ARCH 1-4 test:    F(4,96)  =   8.4152 [0.0000]**
Normality test:   Chi^2(2) =   4.8144 [0.0901]
hetero test:      F(4,99)  =   1.4040 [0.2382]
hetero-X test:    F(4,99)  =   1.5440 [0.1954]
RESET test:       F(1,103) =   77.230 [0.0000]**
```

(NOTE: If you have a large number of explanatory variables the hetero-X test may not be defined).

## 2.3.2 Graphical analysis

Figure 29: Graphing options
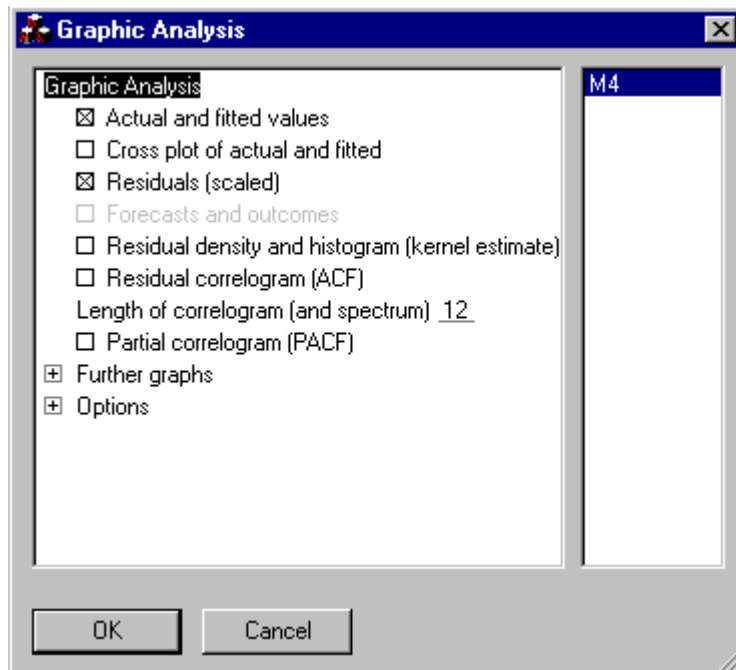
This is used as more information for evaluating your model. After any regression you should always plot the residuals. In addition, if you are undertaking serial correlation tests plotting the correlogram (spectrum and PACF) may give you some assistance in identifying the nature of the serial correlation. Plotting the density will give some indication of the extent of the violation of the normality hypothesis.

Choosing: Further graphs from Figure 29 allows you to plot the unscaled residuals, residual spectrum, QQ plots against N(0,1), residual density, residual histogram and residual distribution.

2.3.3 Recursive graphical analysis

If you selected recursive estimation in estimation window (Figure 27) and supplied enough initial values, the recursive graphic option yields Figure 30. This allows the production of a series of graphs (in **PcGive Graphics window**) showing the stability of the model over the sample period. Including recursive plots of the specified coefficients and the t-ratios of these coefficients. You specify a variable by highlighting it in the RHS panel. In addition, a variety of recursive Chow tests are reported. Chow 1-step compares the RSS over (t-1) periods with RSS over t periods, Chow N$\downarrow$ -step compares RSS for T with RSS for (t-k-1), while Chow N$\uparrow$ -step compares RSS over (M-k-1) with RSS over (t-k-1), where M is the initial number of observations over which the model has been estimated.
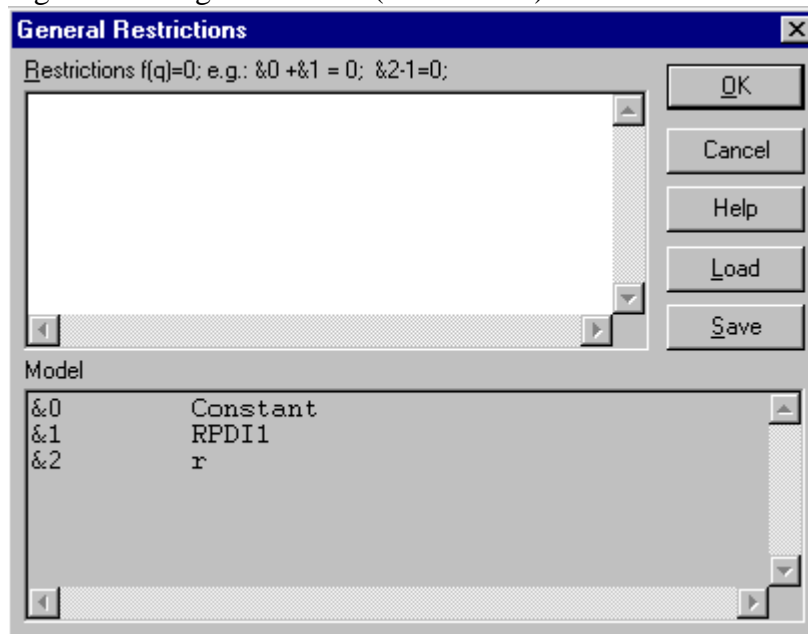
Figure 30: Recursive graphing options
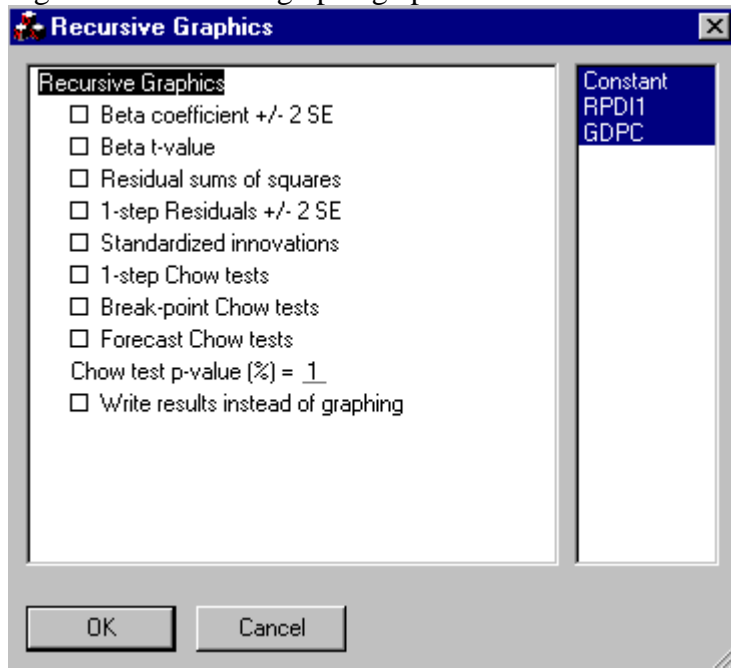
2.3.4 Restrictions

There are a variety of restrictions one can test on the parameters of the model one has just estimated. In PcGive there are basically 4 alternatives:

General restrictions

Figure 31: For general linear (or nonlinear) restrictions

This enable one to specify a series of restrictions, for example if one wished to test $\alpha = 1$ and $\beta_2 = 0.5\beta_1$. In the box above one would type (nonlinear restrictions are permitted):

&0-1=0; &1-0.5*&2=0;
and then click OK. [NOTE &0 is the constant, &1 and &2 are the coefficients on RPDI and r].
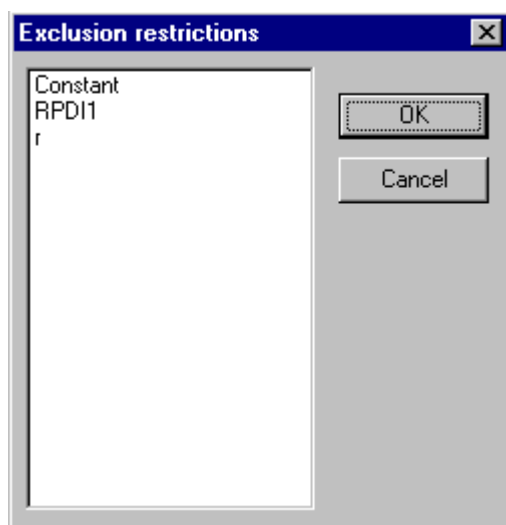The output from PcGive is

```
Test for general restrictions:
&0-1=0; &1-0.5*&2=0;
GenRes Chi^2(2) = 2294.71 [0.0000] **
```

Exclusion restrictions

Selecting any subset of variables from the list in of regressors in Figure 32, tests the restriction that these variables are jointly equal to zero.
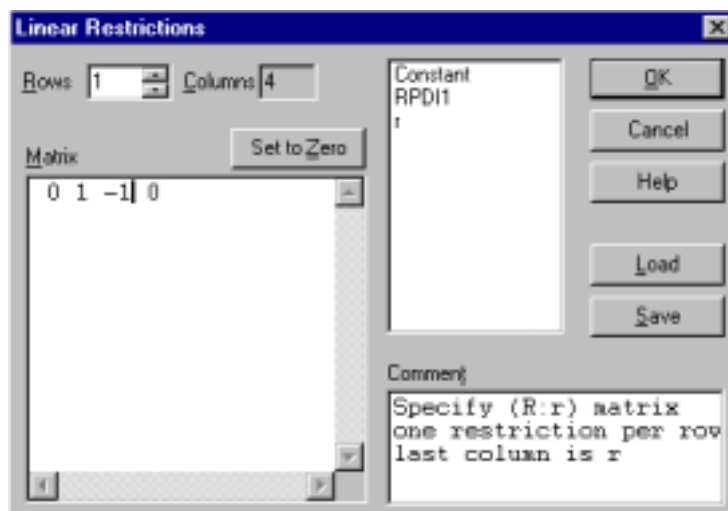
Figure 32: exclusion restrictions

Linear restrictions

Selecting Linear restrictions yields Figure 33, which requires you to specify the linear restrictions in the form of RB=r for g<k restrictions. The restrictions are inputted as R:r, such that to impose $\beta_1 = \beta_2$, we have R=[0 1 –1] and r=0, in which case the restrictions are:

Figure 33: General linear restrictions (RB=r)

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Clicking OK the output is

```
Test for linear restrictions (Rb=r):
R matrix
     Constant          RPDI1                  r
      0.00000          1.0000          -1.0000
r vector
         0.00000
LinRes F(1,104) = 51.4871 [0.0000] **
```

Omitted variables

This allows you to test whether some variables not included in your original specification of the equation are significant.

2.3.5 Dynamic analysis

The computer can calculate the static long-run solution (including standard error estimates) associated with any given dynamic short-run model. This option also allows the calculation of the joint significance of each variable and its lags in the regression, via an F-test as well as the joint significance of all lag 1, lag 2 etc coefficients.
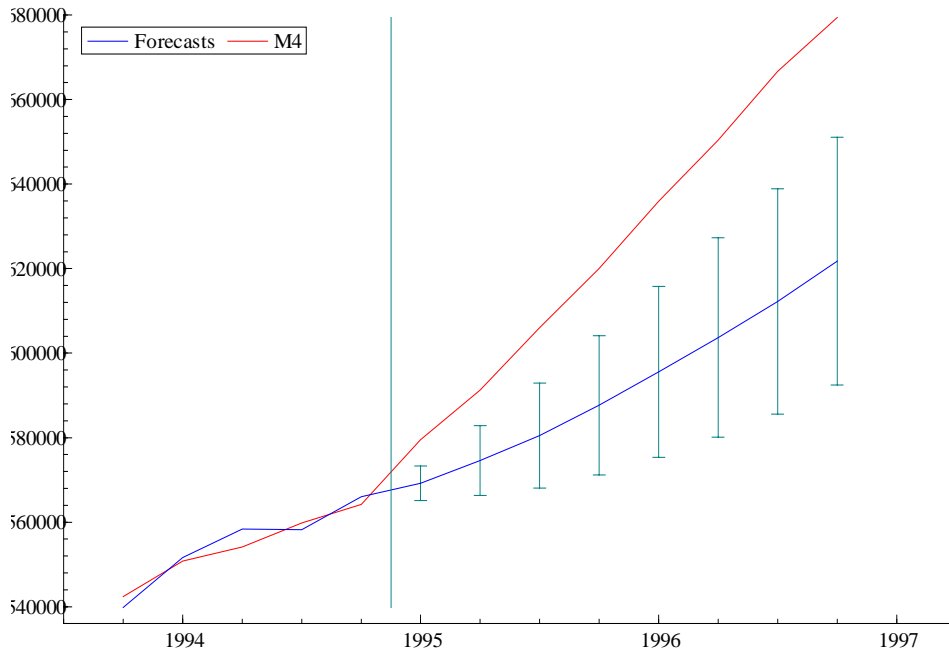
Figure 34: Dynamic analysis
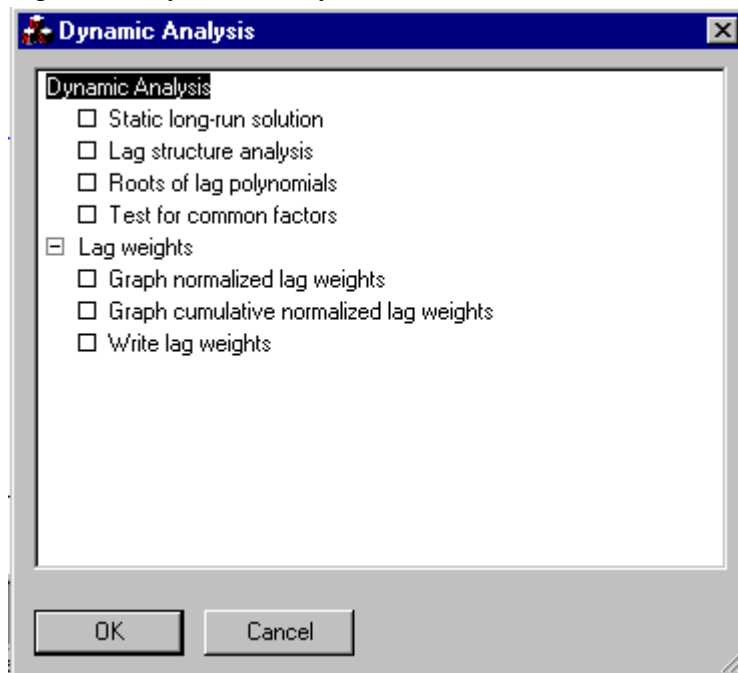
2.3.6 Forecasting

If in Figure 27, some data points were saved in the Less forecasts box, then it is also possible to evaluate the model out-of-sample by undertaking dynamic forecasting. Figure 35 below is an example dynamic forecast, with error bars centred on the forecasts.

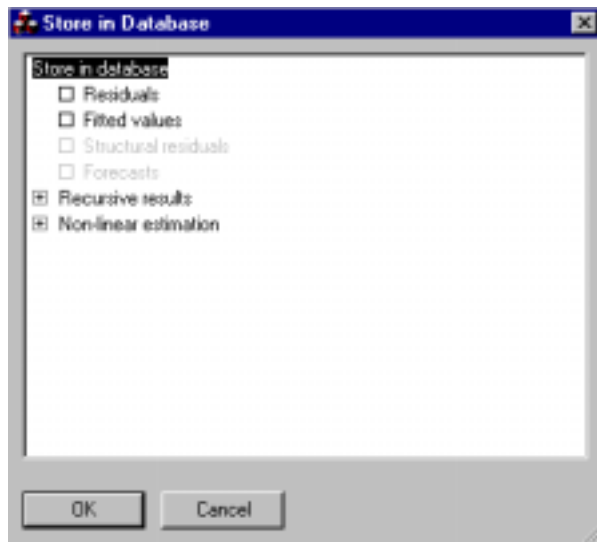Figure 35: Dynamic forecasting of M4

2.3.7 Further output

Figure 36: Additional output available in PcGive
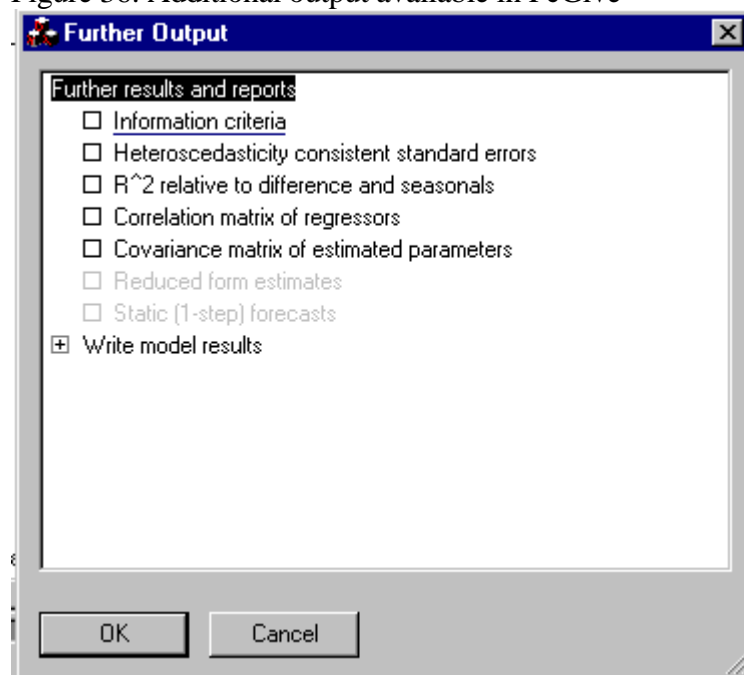
2.3.8 Store in database

As the names suggests enables you to write fitted values and residuals to specified variable names.

Figure 37: Additional information that could be stored

2.4 Cross-section regression

This option is nearly identical to Single-equation Dynamic Modelling, although it rules out any analysis that relies on a time dimension, for example, no lag options are available in formulating the model (see Figure 25), in diagnostic testing no serial correlation or ARCH results are reported, similarly correlograms and spectrums are meaningless and not reported.
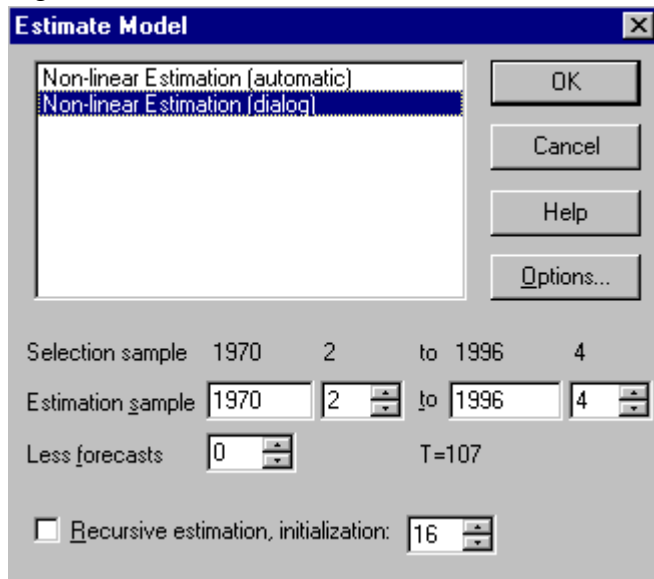
2.5 Non-linear Modelling

Figure 38 presents an example, which estimates a model of the form

$$LM4 = \alpha + \beta_1 LM4_{t-1} + \beta_2 LRPDI_t + \beta_1\beta_2 LRPDI_{t-1} + \beta_3 r_t + \varepsilon_t$$
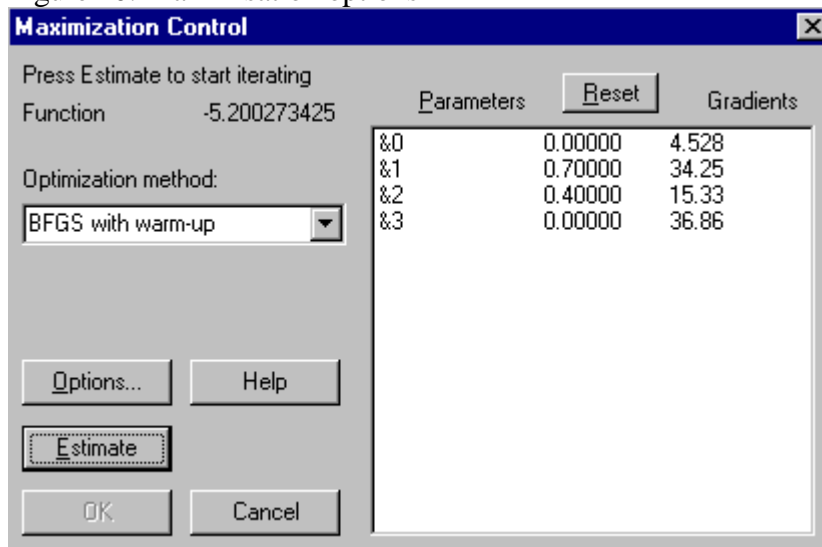
Figure 38: Non-linear estimation
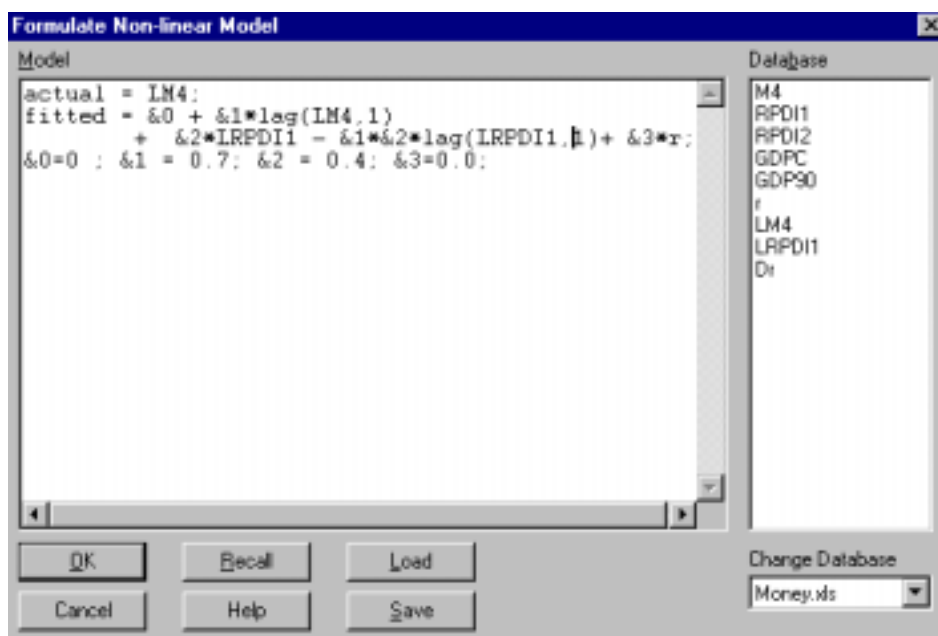
[Note: You must supply initial values for **ALL** parameters – even if these are zero].
Clicking OK yields Figure 39,

Figure 39: Non-linear estimation box

in which upon selecting non-linear (dialog box) one gets Figure 40, which controls the estimation and convergence criteria

Figure 40: Maximisation options

Clicking estimate yields the output:

```
EQ( 1) Modelling actual by NLS (using Money.xls)
        The estimation sample is: 1970 (2) to 1996 (4)


             Coefficient  Std.Error   t-value   t-prob  Part.R^2
&0            0.0817537     0.01438       5.69    0.000    0.2388
&1            0.994705      0.001151      864.    0.000    0.9999
&2            0.0593777     0.04407       1.35    0.181    0.0173
&3            0.00105869    0.0003369     3.14    0.002    0.0875
```

```
sigma                   0.0114065  RSS                0.0134011721
log-likelihood           328.884   DW                         1.13
no. of observations          107   no. of parameters             4
mean(actual)             11.9781   var(actual)             1.00776


Standard errors based on information matrix
BFGS/warm-up   using   numerical   derivatives   (eps1=0.0001;
eps2=0.005):
Strong convergence
```

NOTE: Throughout the program there are help options to the manual and these are very useful.