

PcGive for Windows

A Brief Introduction to the Computer Program

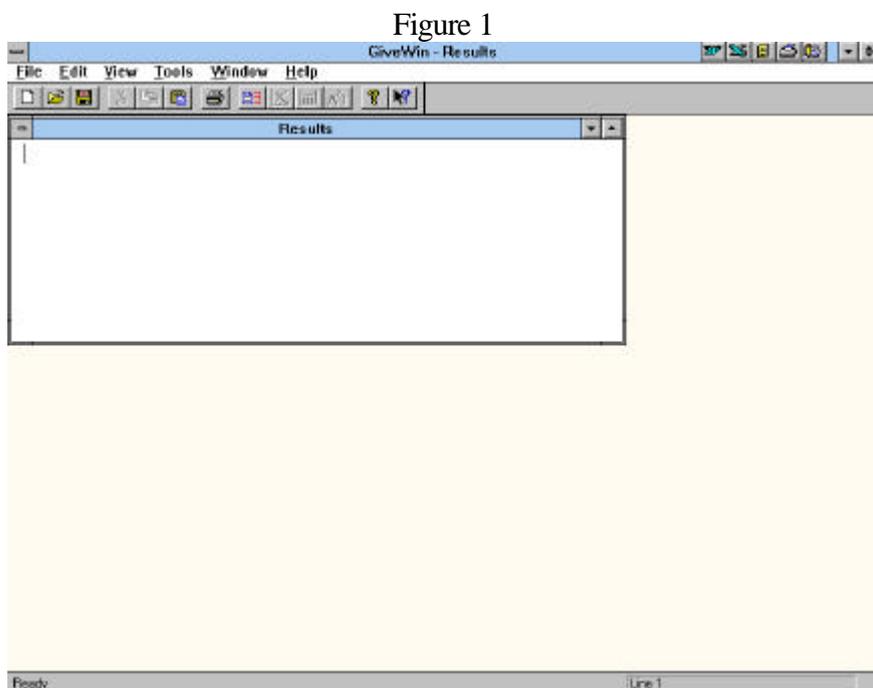
Introduction

The aim of this note is to introduce students to the interactive econometrics computer program PcGive 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 9.0: An Interactive Econometric Modelling System" (by J. A. Doornik and D. F. Hendry publisher Thomson).

PcGive is a windows based program and is in the GiveWin icon. To access the program it is first necessary to click on Givewin icon and then on PcGive program group. The program has basically been split into two; (i) GiveWin this part is concerned with data loading, data management and graphing, it also has the **Results windows** where output from PcGive goes; (ii) PcGive is simply concerned with the formulation and estimating and testing of equations.

(1) GiveWin

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



The screen contains a series of drag down menus and picture 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 an open **Results Window**. The **Results Window** is very important for your work, as all the results generated during your session on PcGive will be recorded into this window. At the end of your session (and before you exit) it is important to write the results of this window into an output file, otherwise they will be **lost**.

We will go through the basic steps necessary to input data into GiveWin (from various formats), undertake basic data description, estimate regression equations and test these regression models.

(a) Edit

This menu is primarily useful to edit the **Results Window**, which will contain information on your session on PcGive including your regression results and summary statistics. The editor works in a similar to that of the Microsoft editor. If you have a mouse you will have two cursors, one associated with the keyboard and moved by the arrow keys and PgUp and PgDn, the other controlled by the mouse. To insert text simply move the cursor to the position in the text you want to insert something and start typing. Pressing INS takes you from Insert mode to Overwrite mode. DEL deletes text under the cursor, while Backshift delete text immediately to the left of the cursor. (**Note:** The editor does not automatically wrap the text around).

<u>U</u> ndo	[Ctrl+Z]
Cu <u>t</u>	[Ctrl+X]
<u>C</u> opy	[Ctrl+C]
<u>P</u> aste	[Ctrl+V]
<u>D</u> elete	[Del]
Select <u>A</u> ll	
<u>F</u> ind...	
Find <u>N</u> ext	[F3]
<u>R</u> eplace...	

To highlight a section of the document you can either use the mouse or the keyboard keys. To mark a section of the document. First, go to the point in the document where you want to start editing from. With the mouse hold down the left button and drag the mouse, a section of the document should now be shaded darker, when you get to the point where you want to stop editing simply lift your finger off the left mouse button (the shading ought to remain). [To use the keyboard to highlight, hold down the shift key and use the arrow keys or the PgUp or PgDn keys]. You are

now in a position to cut, paste, or copy the text you have marked as you want using the edit menu, the options for which are noted below and are self explanatory. In addition, to the already mentioned ways for choosing an option from the menus, you could use the quick keyboard instructions (available for some options) which are noted next to the function. For example, having highlighted a block of text, typing [Ctrl+X] will cut the highlighted block, hitting [Ctrl+V] will then paste the text back into the document at the position of the cursor. The options Cut (scissors), Copy (two sheets of paper) and Paste (clipboard and paper) options have quick picture icons available.

(b) File (Alt+F)

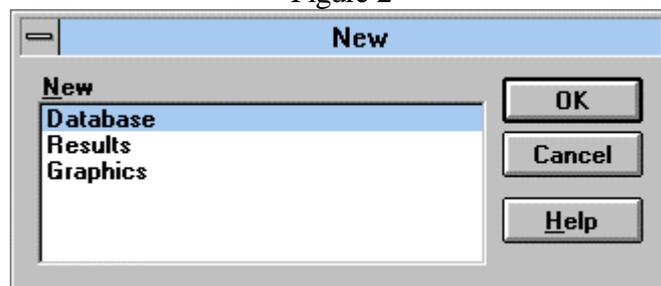
This option enables us to read in data and save data as well as results files:

<u>N</u> ew	Ctrl+N
<u>O</u> pen	Ctrl+O
<u>C</u> lose	
Save <u>A</u> s	
<u>P</u> rint	Ctrl+P
Print Pre <u>v</u> iew	
<u>1</u> DATA.IN7	
<u>2</u> H\MFIT\EMPOY2.IN7	
<u>E</u> xit	

New (Ctrl+N) (or Alt+F and Alt+N)

Enables the opening up of a new database, **Results window** or graphics file. On clicking on New you are faced with the screen (Figure 2)

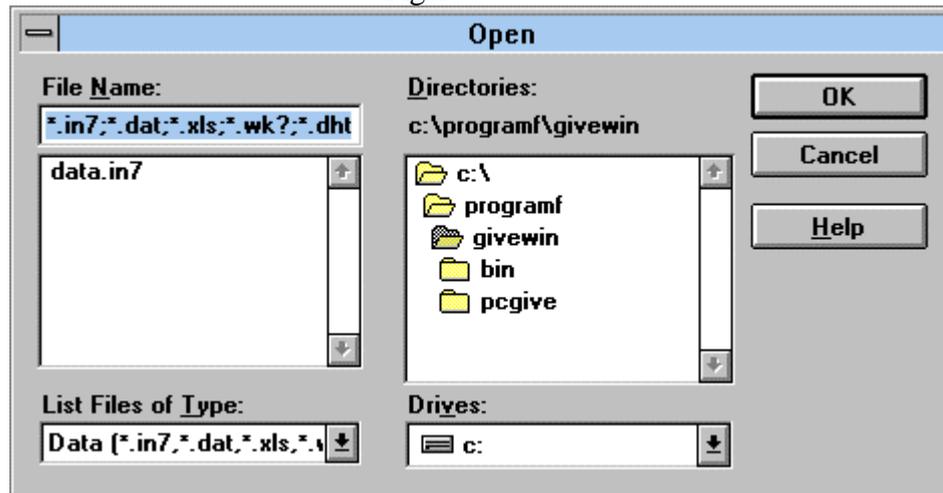
Figure 2



Open (Ctrl+O) (or Alt+F and Alt+O, or open folder icon second from left)

This option is for the reading in of a new (or additional) dataset. The format can be in any of the following formats (i) PcGive (*.in7), (these files are specially created binary file generated by PcGive (and must have been generated in a previous session on PcGive), (ii) ascii (human readable) (*.dat), and (iii) Excel (*.xls), (iv) Quattro Pro (or Lotus) (*.wk?), Figure 3.

Figure 3



To select a file choose the appropriate Drive (invariably h:) and the Directory and then in the List File of Type select the file type from (i) to (iv) above (it is also possible to load previously saved results or graphics files). **Note:** more than one data file can be open at any one time. Having loaded your file PcGive file, for example, data.in7, you get a datafile icon for data.in7 and on double clicking this icon you get Figure 4. This is a basic spreadsheet with the data series along with the variable titles and the sample dates over which the data runs. 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. This spreadsheet operates similarly to most spreadsheets.

If the data is human readable (ascii) (*.dat) you must select List Files of Type as human readable (*.dat) and then you get the screen Figure 5. In which you must fill in the frequency of data, the sample dates, the number of variables and the format of the data, either ordered by observation, or not. The data file ought to contain just numbers with no variable labels.

Figure 4

		CONS	INC	INFLAT	OUTPUT
1953-	1	890.45	908.212	3.6595	1203.77
1953-	2	886.543	900.679	2.7649	1200.36
1953-	3	886.329	899.795	2.521	1193.63
1953-	4	884.885	898.482	1.717	1193.04
1954-	1	885.254	895.777	.9729	1194.11
1954-	2	884.528	894.831	.676	1191.03
1954-	3	884.436	892.741	.1739	1191.47
1954-	4	884.311	892.768	-.3302	1195.34
1955-	1	887.426	896.971	-.4645	1195.51
1955-	2	889.556	901.406	-.3819	1198.2
1955-	3	890.659	901.479	-.2016	1199.24
1955-	4	894.079	905.117	.1956	1203.88
1956-	1	896.831	908.389	.5363	1211.27

Figure 5

Data File Information

Frequency

Annual (or undated)
 Quarterly
 Monthly
 Weekly
 Other:

Sample dates: to

observations in sample: none

Number of Variables:

Ordered by variable
 Treat non-numeric symbols as missing values

For excel files you have a similar screen to Figure 6, the screen requires you to specify the position of the first observation, the frequency and the start and end dates. The excel or lotus file should appear as:

	CONS	INC	INFLAT	WEALTH
1970-1	908.1	981.2	3.4	3045.6

1970-2	910.2	982.3	4.1	3046.2
1970-3	909.2	981.7	4.3	3046.3
1970-4	910.3	983.1	3.2	3048.1
1971-1	910.2	983.2	3.1	3047.9

Figure 6

Close

Closes either the data file or the results file depending upon which is in operation at the time.

Save As....

Or click on the disk icon (third from left) saves either the data file, the results file or the graphic file in a variety of formats. Default for output file is as a *.out text file. For data file it is possible to save the data as PcGive, human readable, Excel or Lotus format.

Print Preview

Previews data which are to be printed.

Print (Ctrl+P)

Or click on the print icon, prints either the data base, the results file or the graph.

1, 2, 3

Are previous datafiles that can be loaded quickly by clicking on the appropriate one.

Exit

Exits GiveWin.

(c) View (Alt+V)

Has a series of pull down options, which controls the appearance of the GiveWin program. Invariably these will not be altered.

✓ <u>T</u> oolbar
✓ <u>S</u> tatus Bar
Set <u>F</u> onts...
✓ <u>F</u> ixed Fonts

(d) Tools (Alt+T)

Has a number of pull down options for transforming and graphing data

<u>G</u> raphics	Alt+G
<u>C</u> alculator	Alt+C
<u>A</u> lgebra	Alt+A
<u>B</u> atch Editor	Alt+B
<u>T</u> ail Probability...	
Graph <u>ics</u> Setup...	
<u>P</u> age Setup...	
<u>P</u> rint Setup...	
Post <u>S</u> cript Setup...	

Graphics (Alt+G)

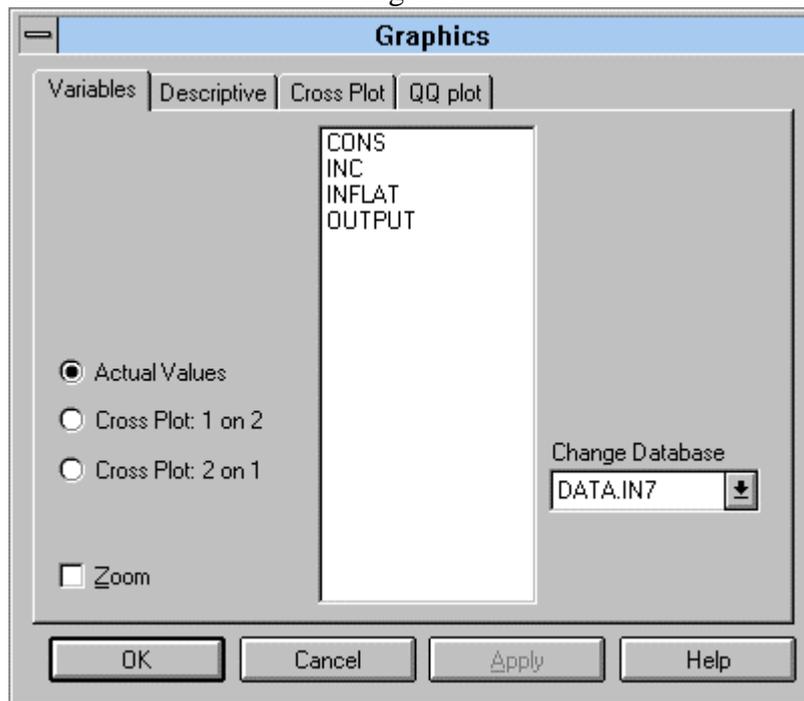
Graph icon (fifth icon from the right). There are basically four types of graphing capabilities in this program; (i) Variables; (ii) Descriptive; (iii) Cross Plot and (iv) QQ plot. We will only look at the first three

(i) Variables

This allows time series plots of any of the variables listed on the screen. Click on any variable and then on OK (or Apply), to get a time series plot of that variable in the **GiveWin Graphics window** (see Figure 7). Clicking on the graphics icon (or pressing (Alt+G)) again and choosing a second variable and OK (Apply) produces a time series plot of the second variable in your graphics window. To plot two series on the same graph click on the first series, then holding the Ctrl key down click on the second series. Unfortunately, unless the scales are similar on the two variables this might be uninformative. Zoom enables the plots to be produced for a sub-set of the observations.

While Change Database enables the user to move between all the databases he/she has open at any one time.

Figure 7



(ii) Descriptive

This enables the user to obtain actual time series plots, cross plots between two series, correlograms, spectrum, density, histogram and the distribution of any individual series or combination of series (see Figure 8). Note you will have to select the Zoom option to change the sample period. Having highlighted a series, simply put an × in each of the options you want. Again clicking on Applying or OK plots the specified variables in the graphics window.

The graphics window allows up to 36 plots on any one screen and these can be copied and plotted directly into Word for Windows (using copy and once in Word clicking on the paste icon; however saving these as graphics files and trying to load these into Word does not appear to work. Unwanted plots can simply be deleted, by highlighting the graph and then pressing Del.

(iii) Cross Plot

This allows the cross plot of one variable against another, with the possibility of fitting a number of regression lines (or spline curves) to the series of points and representing the points with different symbols (see Figure 9)

10
Figure 8

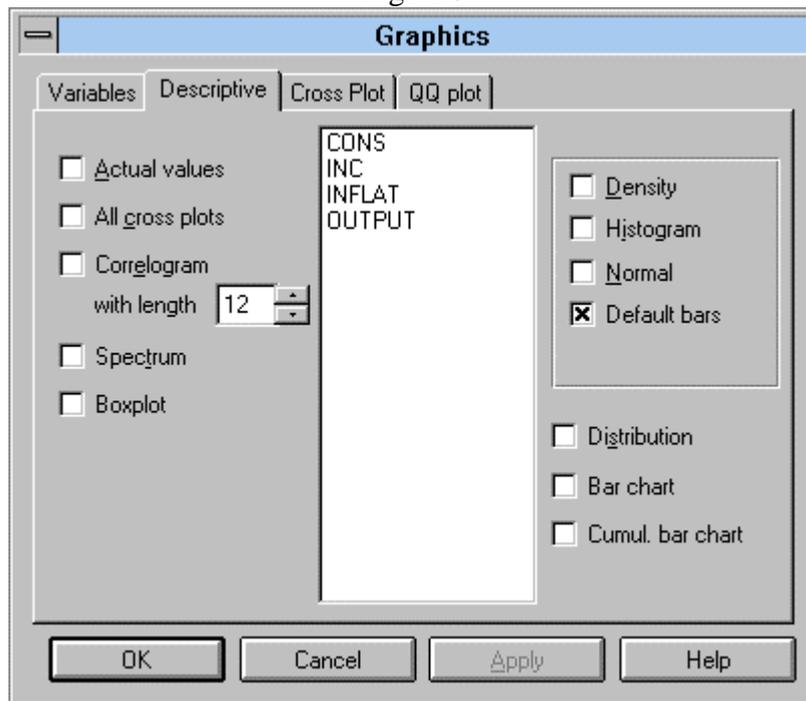
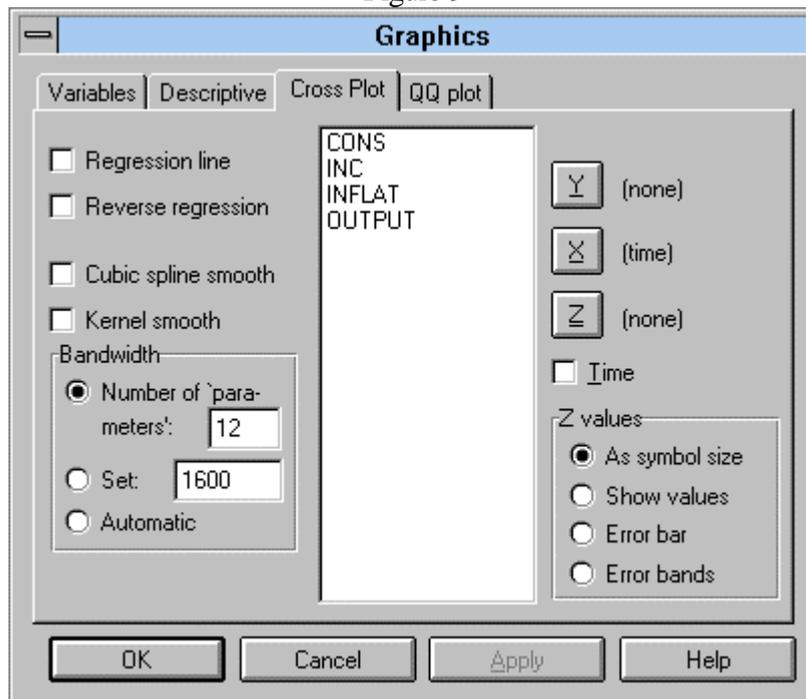
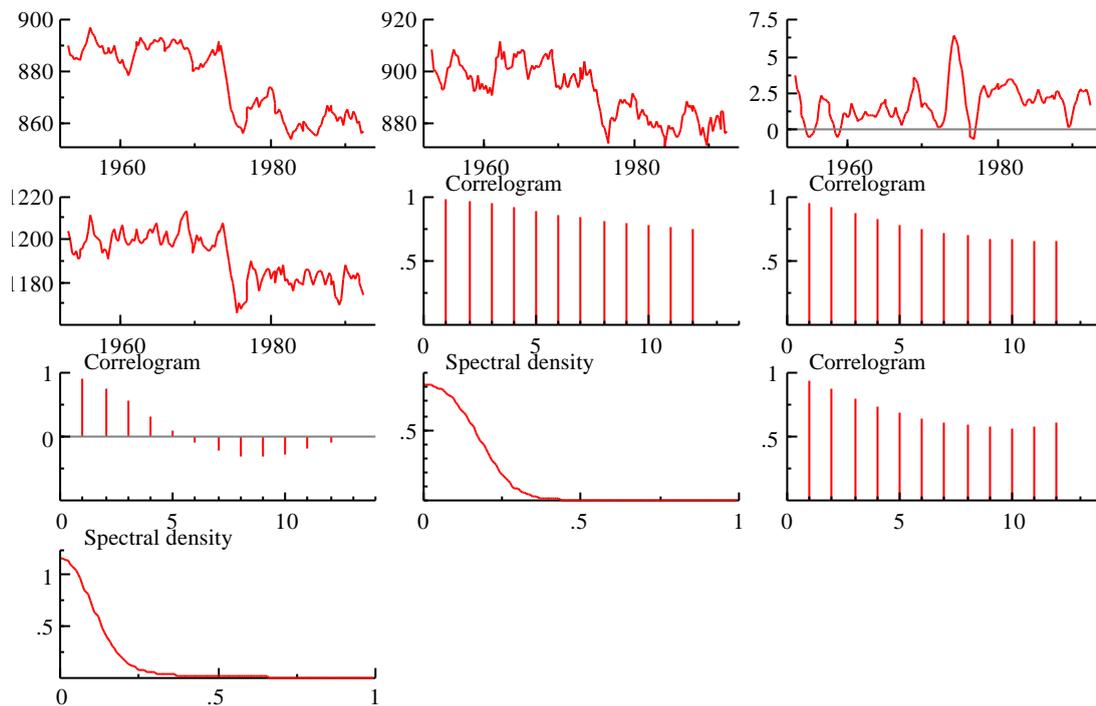


Figure 9



Below (Figure 10) is an example of the results of plotting a number of the series and their spectrum and correlograms

11
Figure 10

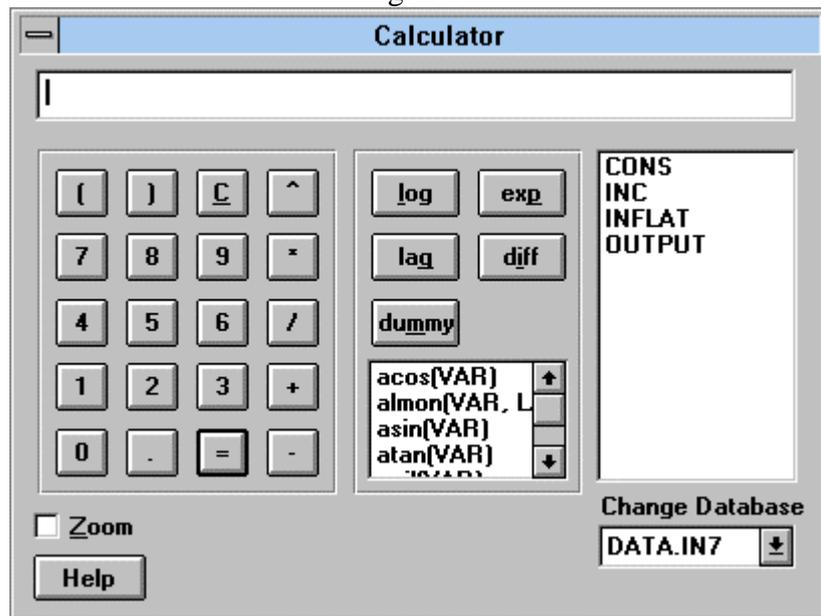


Calculator

Or choosing calculator icon (fourth icon from the right) loads the calculator window (see Figure 11). This is the option for undertaking data transformations. Select an operation, for example, log, (or lag, exp, Diff or Dummy), having selected the transformation you must then select the variable from the list of variables, by clicking on the variable. The top box will now read log(CONS) (Diff(CONS), lag(CONS,1)). Click on the = key to evaluate the expression, you are now asked to supply the Destination Name, the program suggests LCONS (or DCONS), 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 box below the more often used transformations.

Note: The dummy option enables the construct of either impulse or step dummy variables.

Figure 11



Algebra

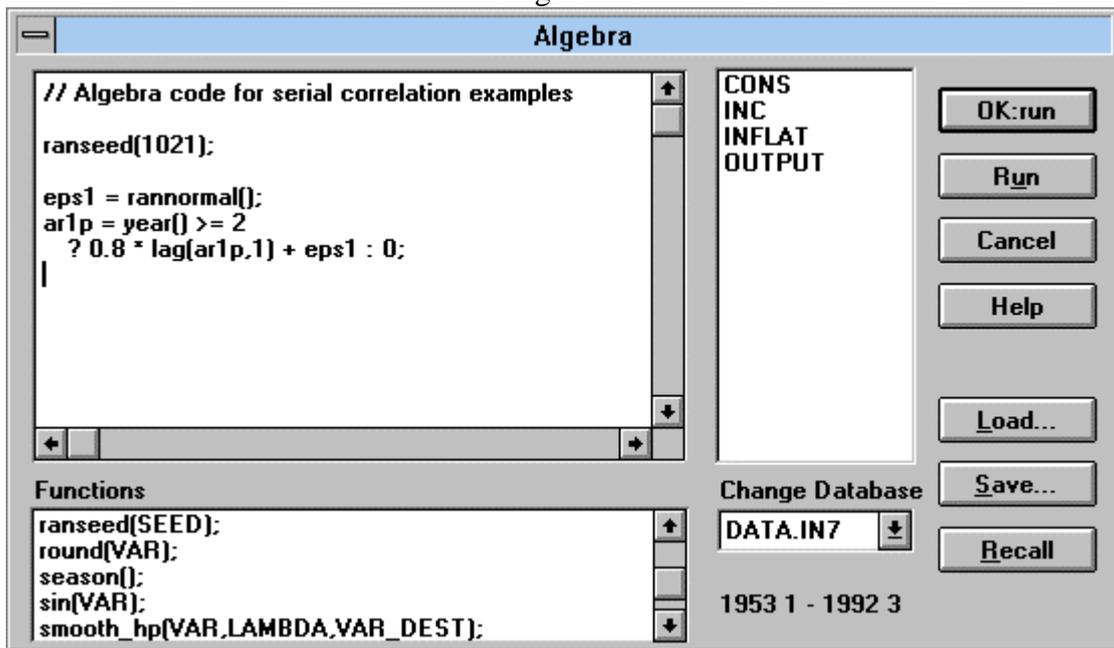
Choosing algebra (or the third icon from the right) loads the algebra window (see Figure 12). As an alternative to using the calculator to generate new series, it is possible to use the algebra window. In this case, you actually write out the transformations you want GiveWin to undertake explicitly. There are a series of function options which you can scroll through in the function box. Having written the transformations you want 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 be followed with a semi-colon. Figure 12 generates data from an AR(1) model. Remember all commands must be followed with a semi-colon; the first command chooses the random number generator seed; the second constructs a random variable called eps to be $N(0,1)$; the third command constructs a variable ar1p. The command before the question mark is the **IF** statement, the command following, and before the colon, is the **THEN** statement and the command after the colon and before the semi-colon is the **ELSE** statement. Interpreting this command: if the year is greater than or equal to 2 then $a1p=0.8*ar1p(-1)+eps$, else $ar1p=0$. Clicking OK:run executes these commands.

Note 1: The computer can generate random numbers from normal (`rannormal()`), t (`rant(df)`), c^2 **Error! Switch argument not specified.** (`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 2: `no=-1` uses the default value

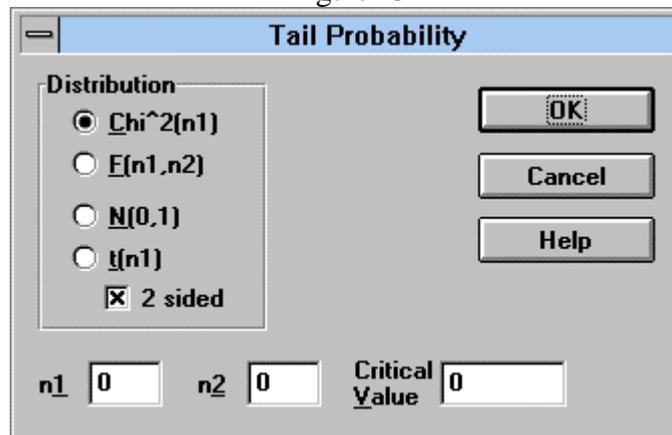
14
Figure 12



Tail Probability

Given any value for one of the specified distributions ($F(n_1, n_2)$, $t(n_1)$, $\chi^2(n_1)$ and $N(0, 1)$ and values for n_1 and n_2) GiveWin will give the probability of observing a number as big as this.

Figure 13

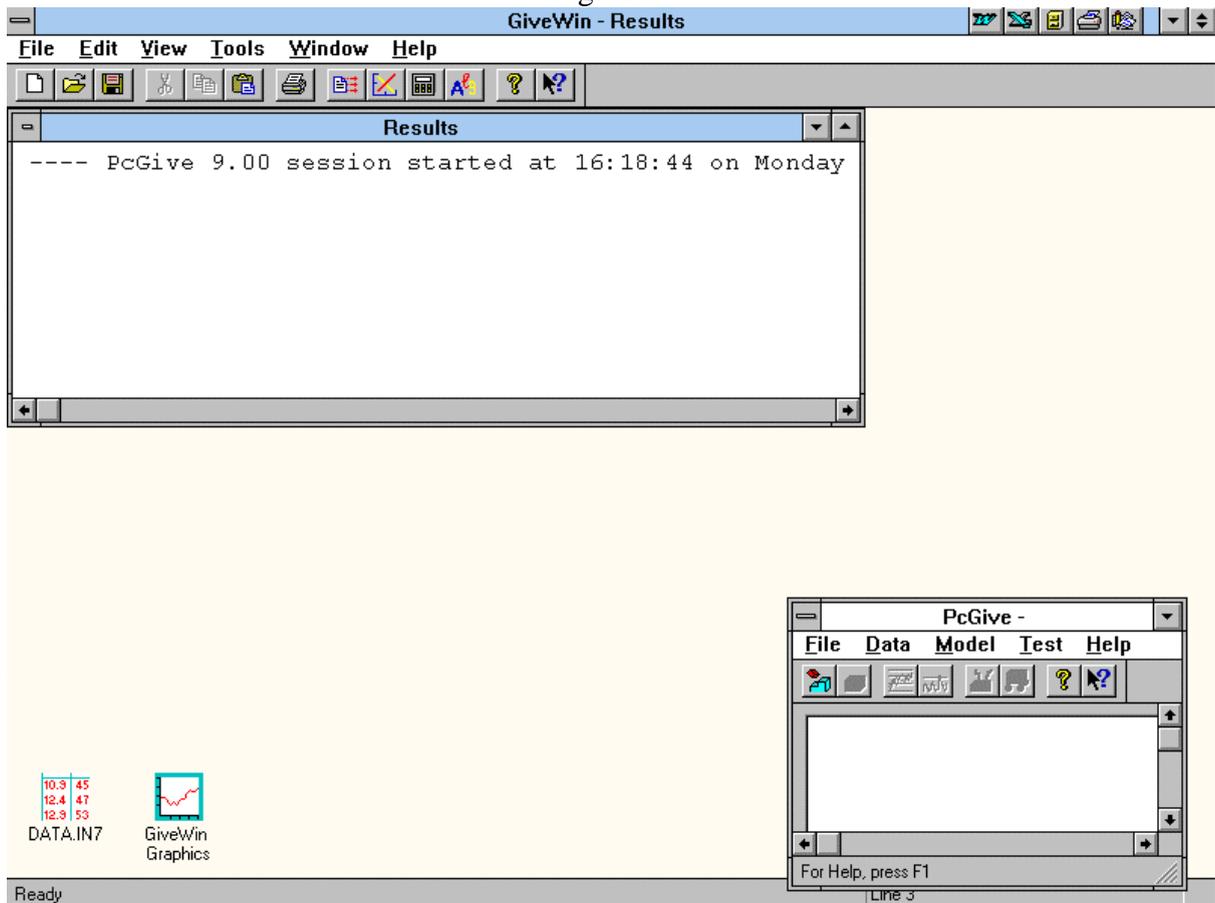


Most of the other options are used primarily to control the quality of output or the presentation of the windows.

(2) PcGive

Clicking on the PcGive Icon, open up this window into the GiveWin window as in Figure 14, which has a series of options which will be discussed in turn.

15
Figure 14



(a) File

<input checked="" type="checkbox"/> Always on <u>T</u> op <u>E</u> xit

The first option ensures that the PcGive window is always visible. The second exits from PcGive.

(b) Data

<u>D</u> escriptive Statistics... <u>A</u> utoregressive Distributed Lag...
--

Descriptive statistics

This will perform normality tests (including measures of mean, variance, skewness and kurtosis), correlations (between two series) and unit root tests, using The Augmented Dickey-Fuller (ADF) tests on each series (see Figure 15). The user must determine the existence of the nuisance parameters, that is, whether there is a constant, or a constant and trend and/or seasonal parameters, as well as the lag length to be used. The **Results window** in GiveWin reports a table, which gives ADF tests for lags 1, up to 5. In addition, to the ADF t-test, the program also reports the t-ratio on

the highest lag present and the standard error of the regression, to determine the optimal lag length. Zoom enables the sample size to be changed.

Figure 15

The 'Descriptive Statistics' dialog box features a 'Database' list with the following items: CONS, INC, INFLAT, OUTPUT, and Var5. On the left, there are three unchecked checkboxes: 'Normality tests', 'Correlations', and 'Unit-root tests'. Below these is a 'Lag' input field containing the number '5'. Further down are four checkboxes: 'Constant' (checked), 'Trend (and Constant)' (unchecked), 'Seasonals (and Constant)' (unchecked), and 'Summary table' (checked). At the bottom left is an unchecked checkbox for 'Zoom sample'. On the right side, there are three buttons: 'OK', 'Cancel', and 'Help'. At the bottom right, there is a 'Change Database' section with a dropdown menu currently showing 'DATA.IN7'.

Autoregressive distributed lag

Fits an Autoregressive model of a specified order p to indicated series.

Figure 16

The 'Autoregressive Distributed Lag' dialog box features a 'Database' list with the following items: CONS, INC, INFLAT, OUTPUT, and Var5. On the left, there are two 'Lag' input fields, one for 'Dependent' and one for 'Explanatory', both containing the number '0'. At the bottom left is an unchecked checkbox for 'Zoom sample'. On the right side, there are three buttons: 'OK', 'Cancel', and 'Help'. At the bottom right, there is a 'Change Database' section with a dropdown menu currently showing 'DATA.IN7'.

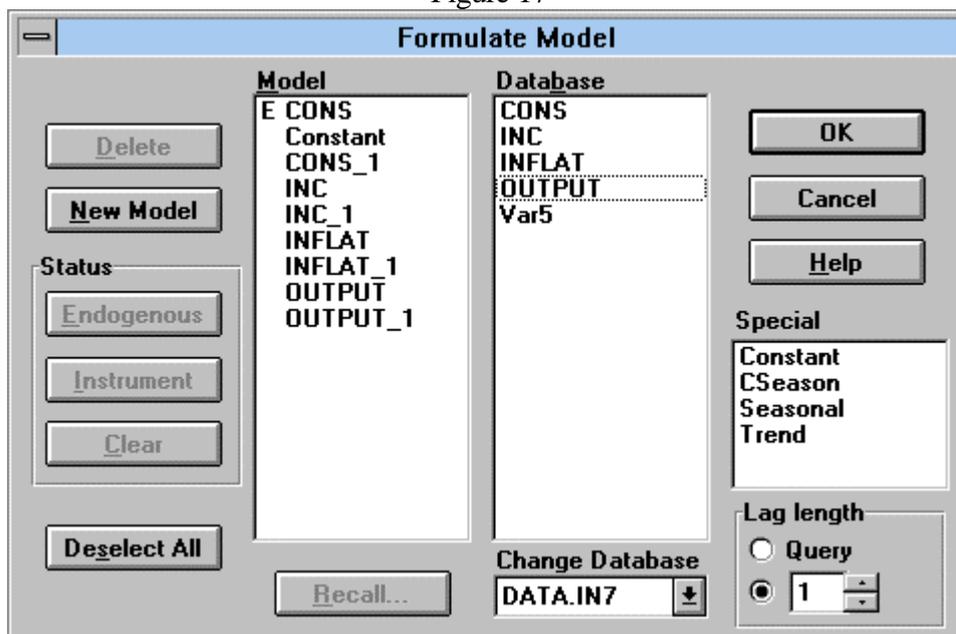
(c) Model

<u>F</u> ormulate	Alt+Y
<u>E</u> stimate	Alt+L
Non- <u>l</u> inear model	
Pr <u>O</u> file	
<u>P</u> rogress	
<u>E</u> ncompassing	

Formulate

To formulate a model select the variables from the Database box (in Figure 17). Each variable is selected by clicking on the variable twice, the lag length of each variable is then selected either as a default of, for example 1, or putting a bullet in Query in which case you are asked for the lag length of each variable selected. The endogenous variable is identified by the letter, E in the Model box. Incorrectly chosen variables can be Deleted. Having chosen the model select **OK**,

Figure 17



you are immediately presented with the Estimation box (see Figure 18), which enables you to specify the sample period and the estimation method and whether or not forecasts are required. If you select Forecasts then you must specify how many periods you want to forecast over, the default is zero. Choosing Recursive estimation (with either OLS or Instrumental Variables) means you must specify Initialization (must be at least equal to the number of explanatory variables+1 - but

preferably more). Having filled in this section clicking OK, will estimate the model over the specified period.

Having chosen OLS you will get the OLS results including parameter estimates, t-ratios (and tail probabilities) and summary statistics on the regression (standard error of the regression, D-W statistic, RSS and F-test of joint significance) in the **Results Window**.

Figure 18

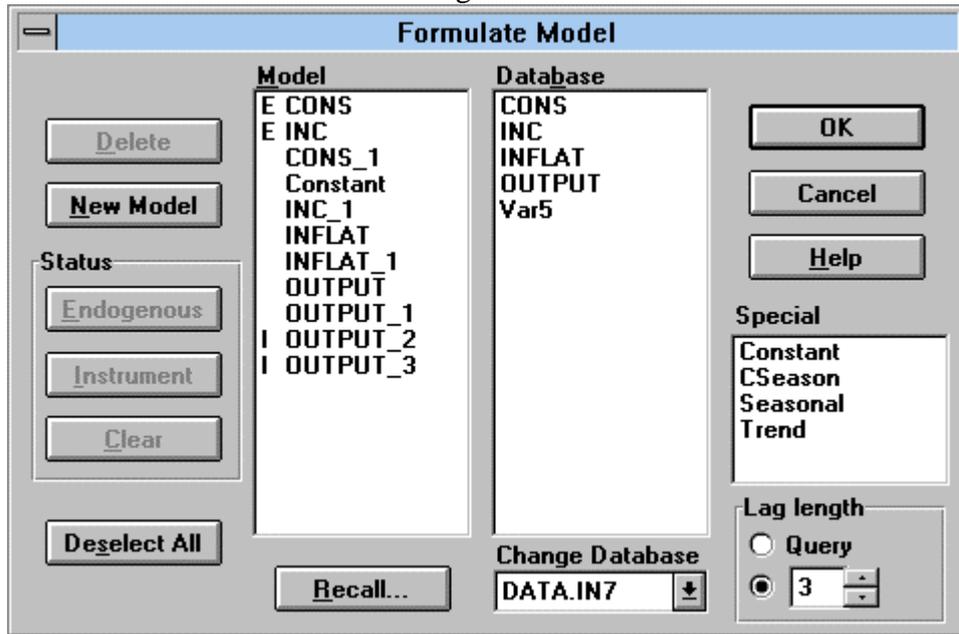
The screenshot shows the 'Estimate Model' dialog box with the following settings:

- Method:**
 - Ordinary Least Squares
 - Instrumental Variables
 - Autoregressive Least Squares
 - Non-linear model
- Buttons:** OK, Cancel, Help, Profile...
- Selection sample:** 1953 2 to 1992 3
- Estimation sample:** 1953 2 to 1992 3
- Less forecasts:** 0
- Recursive estimation, initialization:** 0

Note that the endogenous variable (marked E) will automatically be the one at the top of the list of variable (in Figure 17). To change the status of the variables (and make a variable further down the list into the endogenous variable), you must first highlight CONS and click on Clear and then highlight, for example, INC and click on Endogenous. INC should now be marked E.

For Instrumental Variable (IV) estimation the model formulation (Figure 17) will have at least two endogenous variables the top one will be the left-hand side endogenous variable and the lower, the right hand side endogenous variable. It is imperative then that in the model selection stage you also select **at least** two instruments (although you can obviously choose more). The model selection would now look like (Figure 19) and in Figure 18, estimation is done using Instrumental Variable estimation. PcGive reports the two reduced form regressions for CONS and INC as well as the structural parameter estimates for the CONS equation.

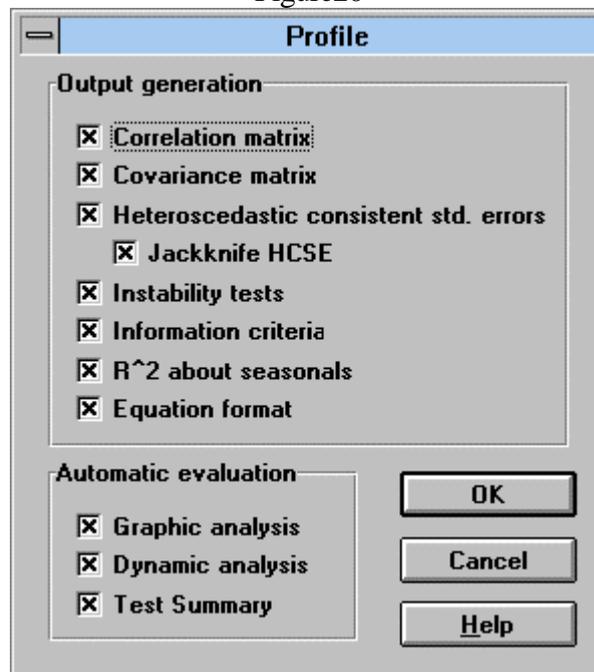
Figure 19



Profile

This controls the output generated by PcGive in the **Results Window** (see Figure 20), a  in each box generates that output in the **Results Window** after each regression by default.

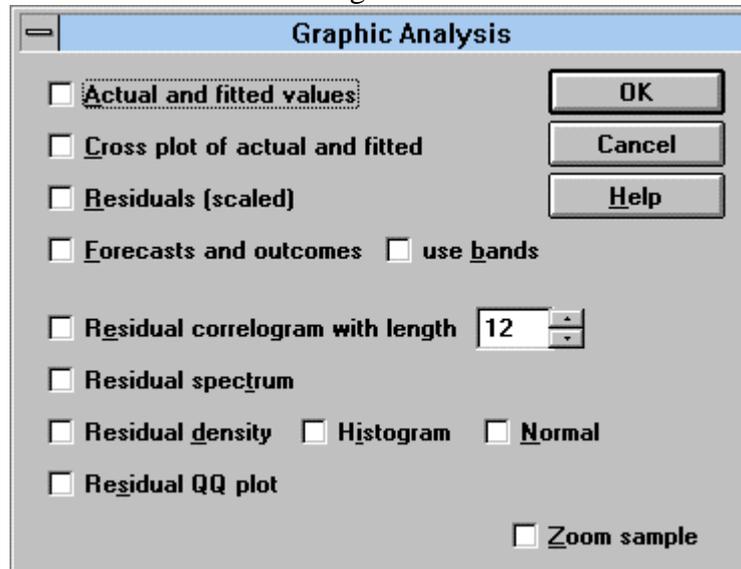
Figure20



Putting an  in each of the Automatic evaluation option boxes controls diagnostic testing of the regression results. In which case after estimation you are presented with the Graphic Analysis

window (Figure 21) (if this does not arise by default then select Test and Graphic Analysis (or Alt+G))

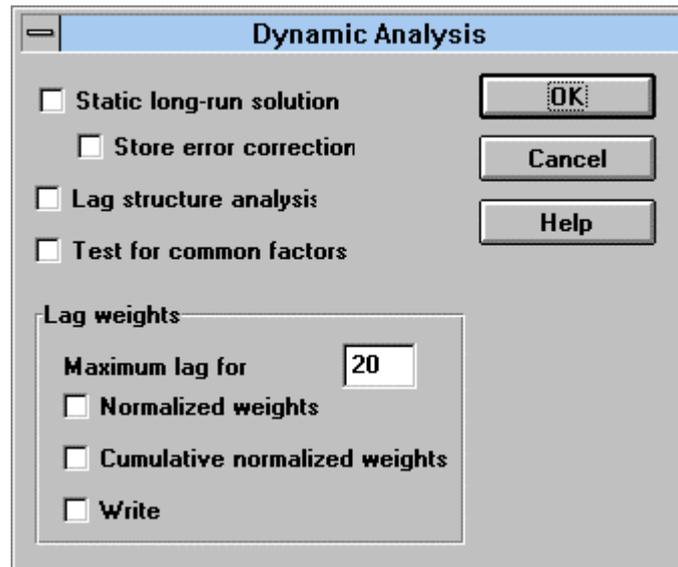
Figure 21



This allows the plotting of the residuals as well as their correlogram, spectrum and density. These plots are reported in the **PcGive Graphics window**.

Following this you are presented with the Dynamic Analysis (if this does not arise by default then select Test followed by Dynamic Analysis) window (see Figure 22), which calculates the long-run model (including standard error estimates) associated with any given short-run model. This option will also calculate the joint significance of each variable and its lags in the regression, via an F-test. Finally it calculates the joint significance of all lag 1, lag 2 etc coefficients. Also available is an option to save the Error Correction term.

Figure 22

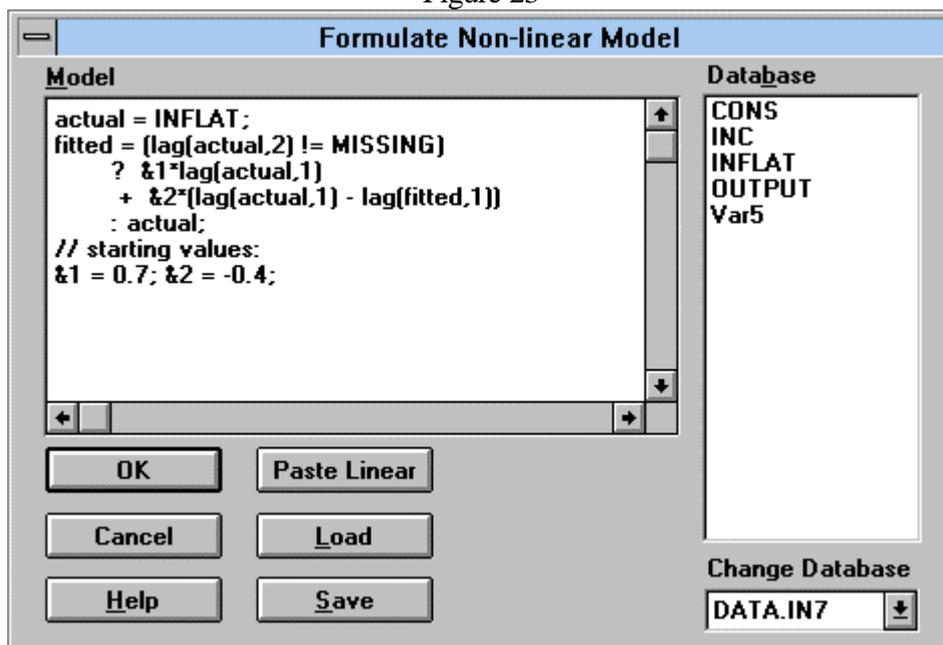


These results are reported in the **Results window**.

Non-linear Model

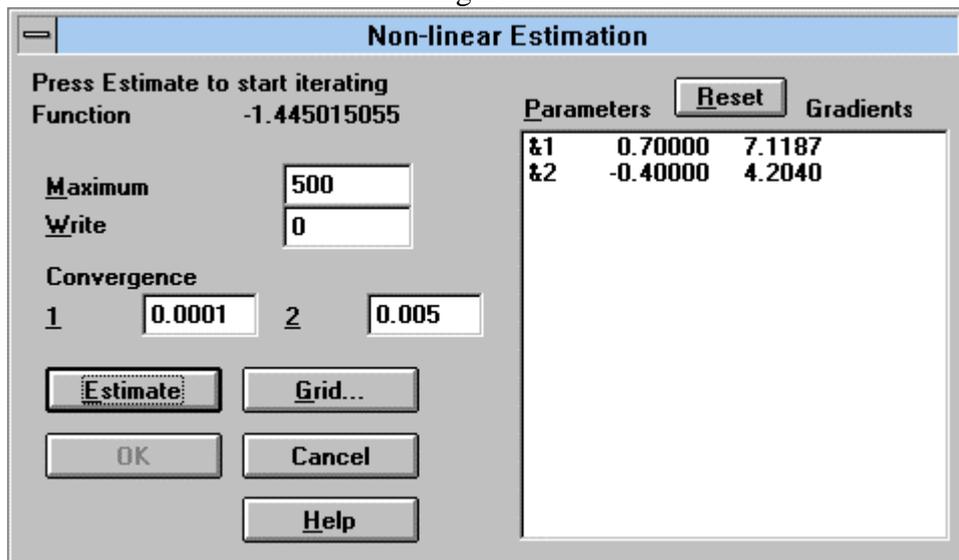
Figure 23 presents an example which estimates an ARMA(1,1) model for the series INFLAT, using starting values 0.7 for the AR parameter and 0.4 for the MA parameter. It is necessary to use the variables actual and fitted in estimating these equations. The first line simply defines the actual variable=INFLAT. The second line states that **IF** lag(actual,2) is NOT missing **THEN** the fitted values are $\&1 * \text{INFLAT}(-1) + \&2 (\text{INFLAT}(-1) - \hat{\text{INFLAT}}(-1) \text{ Error! Switch argument not specified.})$, **ELSE** the fitted values are the actual values. On selecting OK

Figure 23



you are presented with the Estimation Model window (Figure 18), but with Non-linear model selected as the default. On selecting OK you are presented with the Non-linear Estimation window (Figure 24) clicking on Estimation yields estimates of the model and “strong convergence” indicates the estimation has succeeded (it is possible to change starting values and convergence criteria here)

Figure 24



(d) Test

<u>G</u> raphical analysis...	Alt+G
<u>R</u> ecursive graphics...	Alt+R
<u>D</u> ynamic analysis...	
<u>T</u> est...	
Test <u>s</u> ummary...	Alt+U
Linear restrictions: <u>s</u> ubset...	
Linear restrictions: <u>R</u> b=r...	
<u>G</u> eneral restrictions...	
<u>O</u> mitted variables...	
Store in <u>d</u> atabase...	

Graphical analysis (Alt+G)

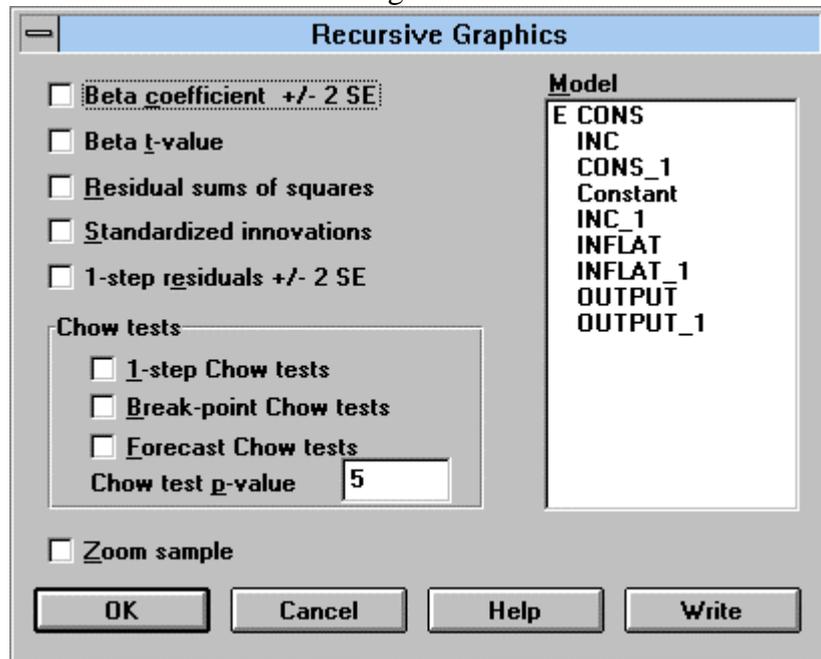
This yields Figure 21.

Recursive graphics (Alt+R)

Having selected recursive estimation in estimation window (Figure 18) and supplied enough initial values the recursive graphic option yields Figure 25. This produces 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. 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↓ **Error! Switch argument not specified.**-step compares RSS for T with RSS for (t-k-1), while Chow N↑ **Error! Switch argument not specified.**-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.

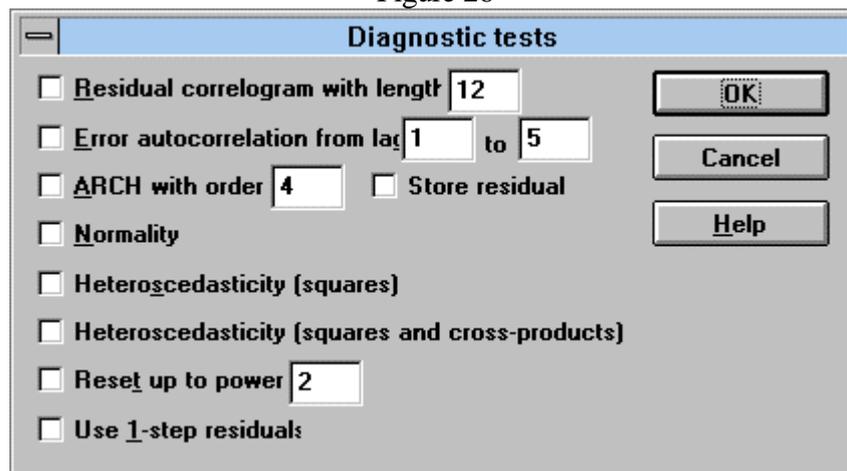
Figure 25



Test

Allows the user to undertake a series of diagnostic tests on the regression model using the list in Figure 26:

Figure 26



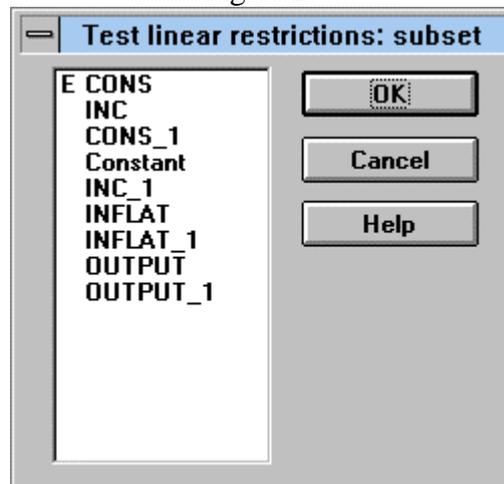
Test Summary

Reports a subset of these diagnostic tests, in particular, the AR(1), ARCH(4), normality, heteroscedasticity and reset tests.

Linear restrictions: subset

Tests the joint significance of a specified subset of the regressors, which are selected from Figure 27.

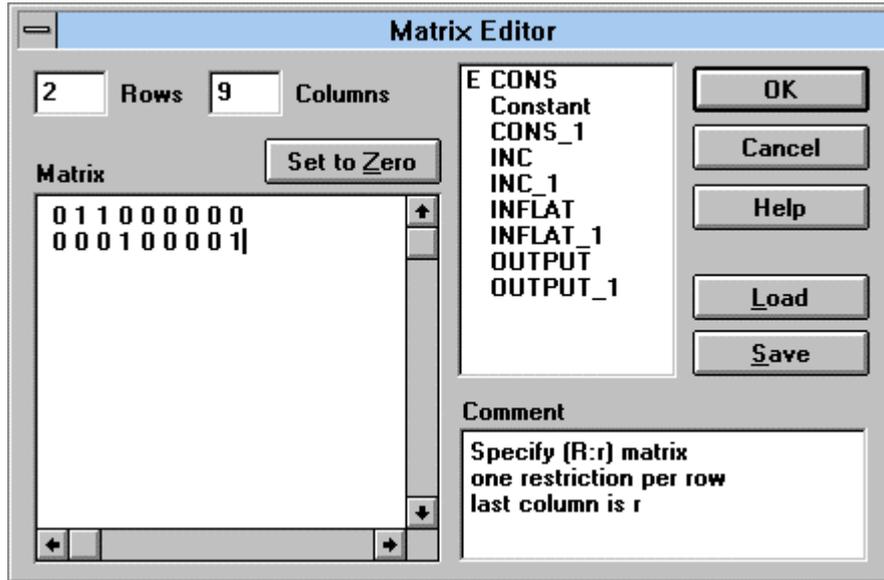
Figure 27



Linear restrictions: ($Rb = r$)

This tests a general set of linear restrictions on the coefficients of the estimated equation. The number of rows relates to the number of restrictions and the number of columns is equal to the number of coefficients in the model plus one. You are required to supply the ($R:r$) matrix where the restrictions imposed are of the form $Rb = r$. For example, Figure 28 tests the joint restrictions $b_1 + b_2 = 0$ and $b_3 = 1$.

Figure 28



Qmitted variables

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

Store in database

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

Throughout the program there are help options which are very useful.