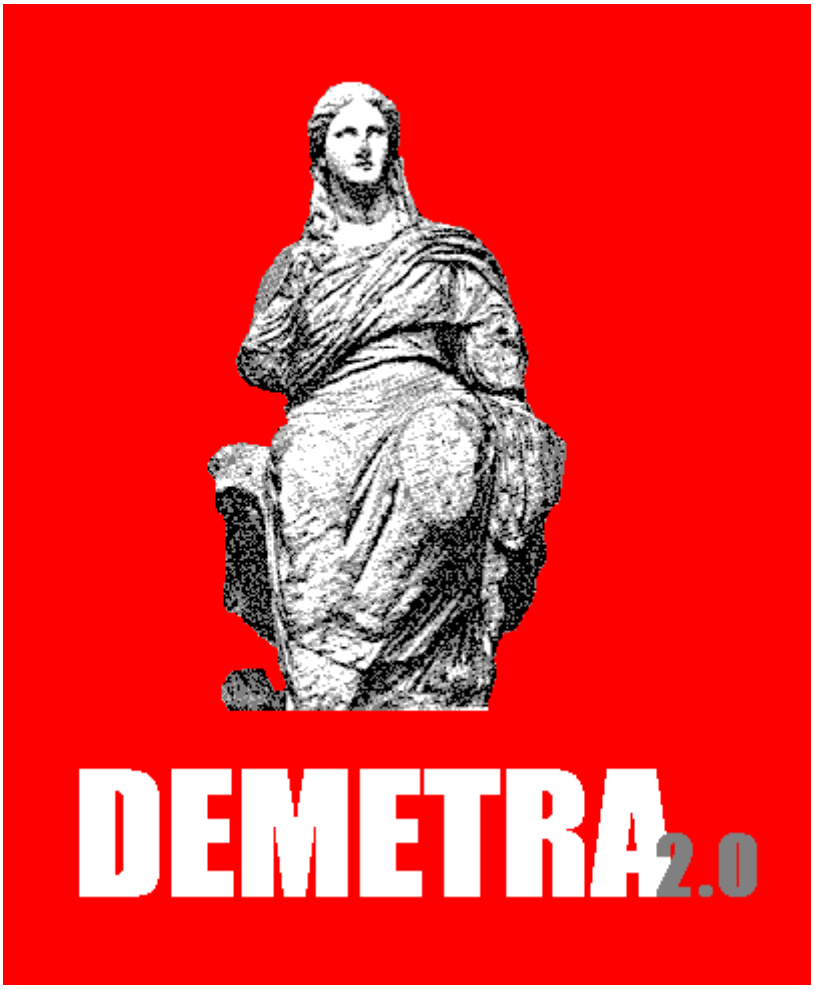
Seasonal Adjustment Interface
for Tramo/Seats and X-12-Arima



User Manual

Release Version 2.0 (Service Pack 1)
May 2002

Demetra

Based on:
Tramo (March 1999)/Seats (May 1998)
X-12-Arima (Release Version 0.2.8)

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by the US Bureau of Census

Contents

Chapter 1 :

What does Demetra?

1.1. Introduction

1.1.1. Overview

Demetra was developed first for Eurostat's internal needs that encompassed several aspects. However, it is freely available to other users in statistical organisations.

It should ease access of non-specialists to TRAMO, SEATS and X-12-ARIMA and improve largely their user-friendliness. However, it should not just consist of nice window representations for the input of the parameters and for some output. Demetra is a tool for statistical production in a large-scale environment imposing a recognised seasonal adjustment policy. It seasonally adjusts large-scale sets of time series, checks the quality of the results, improves the stability of the models, automatically improves rejected adjustments and assists the user in all the treatment. Additionally, it allows detailed analysis on single time series. The interface mainly uses the statistical algorithms included in the SA methods X-12-ARIMA and TRAMO/SEATS. It is a fully menu driven package, using general statistical vocabulary for parameters, models and functions except for very advanced usage.

Demetra includes an I/O interface with FAME, SAS and ORACLE EXPRESS databases, formatted ASCII files and MS-EXCEL worksheets. The "namelist" object of FAME can be used for selecting large-scale sets of time series. Demetra defines a special format to store seasonal adjustment parameters in the I/O files (databases) but the parameters can be saved as well in the original format of the seasonal adjustment methods.

1.1.2. Origins

Eurostat has compared carefully several methods for Seasonal Adjustment (DAINTIES, SABL, BV4, X-11-ARIMA/88, X-11 UK, X-12-ARIMA, TRAMO/SEATS).

It has decided to focus its attention in the future on two SA methods:

- TRAMO/SEATS, an ARIMA model-based method, written by A.MARAVALL and V.GÓMEZ
- X-12-ARIMA of the US Bureau of the Census

An internal task-force has conducted several in-depth comparisons and evaluations of different aspects of these two methods:

- comparison of the pre-adjustment (in X-12-ARIMA and TRAMO)
- comparison of short-term revisions (in X-12-ARIMA and TRAMO/SEATS)
- measurement of regularly changing seasonality (in X-12-ARIMA and TRAMO/SEATS)
- short-term fluctuations due to the filters (in X-12-ARIMA)
- non-admissible decomposition (in SEATS)
- robustness in the estimation of ARIMA models (in X-12-ARIMA and TRAMO)
- robustness vis-à-vis non-linearities (in TRAMO).
- long-term revisions in SEATS
- robustness of SEATS vis-à-vis the identification/estimation of ARIMA models.

What are the conclusions of these studies?

- TRAMO and SEATS are very robust and computationally efficient products for the use of ARIMA model-based seasonal adjustment with a high quality.
- X-12-ARIMA adapts fairly well to many different situations, provided the user is sufficiently skilled.

These studies and the interfaces as mentioned below have been presented and distributed to National Statistical Offices and Central Banks of the European Union. The reaction of the delegates from these organisations gave the impression that:

- the reputation of the X-11 family is extremely high
- a high level of qualification is necessary to understand the sophistication of ARIMA-model-based SA methods and makes difficult to convince practitioners in National Statistical Offices or Central Banks of the qualities of this method

(One of the tasks of Demetra is to easy the application of these methods.)

- the lack of commonly agreed definition of seasonality makes comparisons of methods difficult.

Even when the restrictions above do not occur, there is no universal superiority of one of the two packages (X-12-ARIMA and TRAMO/SEATS) and exceptions can always be found. However, the studies performed by Eurostat as mentioned above almost proved better characteristics of the ARIMA-model-based method in TRAMO/SEATS then these of the ad-hoc filter method implemented in X-12-Arima. Furthermore, although ARIMA-model-based SA methods involve a more sophisticated theory than the X-11 filter, the use of these methods may be simpler in practice since the selection of models is quite reliable.

Development of different interfaces for the seasonal adjustment methods

Faced with this limitation of the theoretical approach, Eurostat decided to add a practical trial: every practitioner should try himself both methods with his series and his own habits and make his judgement.

Therefore, tools that make the use and the comparisons of the competing packages easy were developed. Different types of products were previously available, e.g. for GAUSS and SAS. They interface TRAMO/SEATS and give simpler access to the adjustment options. The first one allows to run X-12-ARIMA and TRAMO/SEATS independently or successively, and to compare easily the results of the SA (with graphs). It incorporates even some statistics on the revisions and compares these between X-12-ARIMA and TRAMO/SEATS.

In parallel to the studies mentioned above, it was decided to implement these two methods in a single interface "Demetra" used by units in charge of the statistical production.

1.1.3. Platforms accessed

Demetra is a client-server application. The main programme of Demetra is a client programme providing a graphical user interface. It runs on the Windows (95, 98, Millennium, NT, 2000, XP) operating systems.

For the access to FAME databases, an additional server programme "Demetra FAME server" is provided. It will automatically be invoked for connections to FAME databases on servers with a Windows NT/2000/XP or UNIX operating system.
For FAME databases on UNIX systems, the "Demetra FAME server" programme has to run permanently on these machines for which it must previously be compiled.

Demetra 2.0 includes I/O interfaces with EXCEL, SAS, ORACLE EXPRESS and TEXT files.

1.2. About Demetra

Demetra is…

- written ΔΗΜΗΤΡΑ in Greek.
- spoken/written Demeter in English.
- the Roman Ceres.
- the Greek goddess of earth and grain (agriculture).
- also considered a goddess of fertility and harvests, most specifically her symbol is wheat.
- the patron goddess of the ancient city of Eleusis in Greece.
- the founder of the Eleusinian Mysteries that were held in Eleusis in her honor each year.
- the daughter of the titans (in some references).
- the mother of Kore/Persephone (Roman Prosperina) by Zeus.

Myth of Demeter (Demetra) and Persephone, Story of the Seasons

Demeter and Persephone from the Parthenon

One day while Persephone was picking flowers in a sunny meadow, the earth opened up, and a chariot appeared. The chariot was driven by Hades (Pluto), the god of the dead. Hades swept her out of the meadow, and carried her deep into the underworld.
Demeter soon realized that her daughter was missing, and searched for many days and nights, but was unable to find Persephone. Finally she went to Zeus, the king of the gods, to ask where her daughter had gone. He replied that Hades had been struck in love by Aphrodite, the goddess of love, and that Hades had taken Persephone for his bride. The thought of Persephone in the kingdom of the dead was too much for Demeter to bear. Persephone was happy and full of life, and the underworld was dark and full of death.
Demeter mourned for her daughter for an entire year. During her mourning, she did not bless the crops. The crops did not grow, and food became scarce. Finally, Zeus had to put an end to the starvation. If all the mortals died, there would be no one left to worship the gods! He knew that Demeter would not let the crops grow as long as Persephone was away from her, so he ordered Hades to return Persephone.
Hades did not want to anger Zeus, but before returning Persephone to the world above, he made her eat a seed from a pomegranate - the food of the dead. When Persephone returned to her mother, the reunion was joyous. Persephone told her mother everything that had happened to her. When Demeter learned that Hades had forced Persephone to eat a pomegranate seed, Demeter grew sad once again. She knew that anyone who had eaten the food of the dead was doomed to return to the underworld.
But Zeus took pity on them, and struck a compromise. Because Persephone had not eaten the seed willingly, she would only have to return to the underworld for part of the year. During the months when Persephone was away from her, Demeter mourned and did not allow the harvests to grow. This is why we have winter. The rest of the year, when Persephone is back with her mother, the earth is fruitful and the harvests grow.

That is the reason of the seasons, and that is why Demeter is the perfect goddess for seasonal adjustment...

The text/picture above were taken from the http://members.dca.net/rbilson/pere/myth.htm document created by Persephone Brooks-Bilson.

1.3. Overview of the modules

1.3.1. Automated module

The automated module is designed for a seasonal adjustment of one up to a large-scale set of time series.

After the creation of an Automated Module Project that includes all necessary specifications of the series to treat and results to produce, the module is to be used in the following way:

- At the first run and then once a year, use the default or customised parameters to calculate and fix the series-specific modelling parameters
- After an update of the series, apply the fixed modelling parameters time series in a regular adjustment procedure

To calculate new parameter sets, several tools are provided:
- default parameters for a new automatic modelling
- customised parameters for a new modelling
- parameters from a model file for a new modelling
- tool for automatic reduction of trading day regressors
- tool for automatic model stability analysis
- expert system for the improvement of rejected adjustments
- assisted tool for the treatment of rejected adjustments

Often, the user might want to start with default parameters for a new automatic modelling (statistical tool 3: New automatic seasonal adjustment, see page 32),
and then use customised parameters to treat the series with rejected adjustments (statistical tool 4: New customised seasonal adjustment)
All tools are accessible at any moment for one, all or a selection of the time series contained in the project.

For series facing some difficulties, an automated expert system, but also an assisted tool is provided proposing the most frequent ways to overcome the difficulties, and user-friendly presentations like modelling and diagnostics tables and time series graphs (see page 55: Treatment of rejected adjustments). The different trials of the series modelling are presented in parallel. This facilitates the comparison and the choice for the best adjustment.

It is also possible to transfer a series from the Automated Module to the Detailed Analysis Module.

The results of accepted adjustments are automatically saved to the result databases. Hence, it needs specifications for the type and naming of results to be saved and the place for the savings (see below: Customise the saving of result time series).
The user can decide whether new series-specific sets of parameters should be saved to the database (see below: Saving of parameters).

In the regular run and alternatively to an adjustment with a completely fixed parameter set (statistical tool 1: Previous modelling settings, see page 41), the ARIMA and regression parameters can be re-estimated fore the updated time series (statistical tool 2: Previous modelling settings with re-estimation of ARIMA and regression coefficients, see page 42).

The automatic quality check uses a set of diagnostic criteria that can be customised by the user (see below how to Customise rules for the selection of rejected adjustments, or directly page 27 for Criteria for the automatic detection of rejected adjustments).

A quality report for each time series can easily be produced and incorporated into the user's working documents.

1.3.2. Module for detailed analysis of single time series

The procedure for detailed analysis allows in-deep examinations of the seasonal behaviour of single time series. User-friendly graphs and tables assist the user in the examination process. This is a useful tool for analysing very particular time series. The user can take advantage of nearly the whole capacity of the SA-methods: Demetra provides access to almost all options of X-12-Arima and Tramo/Seats.

Demetra provides a user-friendly access to all output of the SA-methods Tramo/Seats and X-12-Arima including text output, data output (time series), diagnostics and graphs. The special modelling and diagnostics tables with the results of the SA-methods Tramo, Seats and X-12-Arima can be viewed with different degrees of detail.

Demetra provides facilities to store the modelling information produced and to recover it at a later point in time. The interface also provides the possibility for saving the result time series together with the corresponding set of the parameters into the production databases, data files or text files and of text output and diagnostics into a text file.

A quality report for the time series analysed can easily be produced and incorporated into the user's working documents.

All tables and graphs can be exported in various formats, as well as copied to the clipboard for further use in other documents.

Chapter 2 :

How to install Demetra?

Demetra is a client-server application. The main programme of Demetra is a client programme providing a graphical user interface. It runs on the Windows (95, 98, Millennium, NT, 2000, XP) operating systems.

For the access to FAME databases, an additional server programme "Demetra FAME server" is provided. It will automatically be invoked for connections to FAME databases on servers with a Windows NT/2000/XP or UNIX operating system.
For FAME databases on UNIX systems, the "Demetra FAME server" programme has to run permanently on these machines for which it must previously be compiled.

2.1. Typical user installation

Minimum configuration:

⇒ PC Pentium TM (64 MB RAM, 128 MB recommended)
⇒ Windows NT 4.0 (service pack 4), Windows 2000, Windows XP or Windows 98/95/Millennium
⇒ Recommended minimum screen resolution: 1024 by 768 pixels, 256 colours

1. Uninstall previous versions of Demetra:

⇒ Open the "Add/Remove Programs" function in the control panel
⇒ Uninstall the "Demetra" programme if listed
⇒ Close the "Add/Remove Programs" function
⇒ Delete the Demetra home directory
⇒ Delete the programme group/icons (if manually created)

2. Execute the file "**Demetra_Install.exe**" and follow the instructions on the screen.

After the installation, a reboot of the PC might be necessary.
The file "**Demetra.hlp**" in the installation directory also provides detailed on-line help for the use of the software and the preparation of the input data.

Remarks: Demetra 2.0 will not be able to load projects saved with beta versions of Demetra (earlier than 1.4) because important changes have been made to the programme structure. However, seasonal adjustment parameters saved by Demetra to the databases can still be used as usual.

It is easy to uninstall the software by using the "Control panel" function "Add/Remove Programs". However, a manual deletion of the home directory of Demetra ("C:\Program Files\Demetra") with some result files left will be necessary.

Demetra 2.0 (Service Pack 1) does not necessarily need anymore an installation of the "Demetra Fame Server" on Windows NT/2000/XP-based servers with Fame when accessed from another Windows NT/2000/XP PC. The service will invoked automatically be invoked on the user's PC.

2.2. Server-based installation

A server-based installation of Demetra 2.0 is possible. That means that the main programme files can be copied to a protected area on a file server, while the user only needs a minimal configuration to run the programme locally.

A special installation file is available from Eurostat that contains all necessary files divided into several paths:

Path in installation file	**Destination path**
Demetra\Common Program Files	<FILESERVER><INSTALLDIR>
Demetra\Common Program Files\Help Files	<FILESERVER><INSTALLDIR>
Demetra\Shared System Files	<USER-PC><WINSYSDIR>
Demetra\User Program Files	<USER-PC><INSTALLDIR>
Demetra\User Program Files\Examples of Input Files	<USER-PC><INSTALLDIR>\Data
Demetra\Unix Fame Server	<UNIXSERVER>/opt/Demetra (or other)

By default: <INSTALLDIR> = <ProgramFilesDir>\Demetra

On the common file server, the appropriate file access rights must be set. Normally, general reading access would avoid users interactions.

On the local user's PC, the installing institution should create the following installation procedure:
- create a program icon in "Program Folder" or "Start Menu Folder" linked to <FILESERVER><INSTALLDIR>\Demetra.exe
- create registry keys:
  HKEY_CURRENT_USER\Software\Demetra\Demetra\SaveUserOpt:
  "home path" = "<USER-PC><INSTALLDIR>\"
  HKEY_LOCAL_MACHINE\SOFTWARE\Demetra\Demetra:
  "HomePath" = "<USER-PC><INSTALLDIR>"

These options ensure that Demetra uses as working directory this local path, and not the common directory on the server to store user-specific files.

2.3. Installation of the “Demetra Fame Server” on a remote Windows XP/2000//NT server allowing a Windows Me/98/95 PC the access to its FAME databases

Remark: FAME version 8/9 must have previously been installed on the PC. Additionally, a system environment variable (path) called "FAME" must be pointed to the FAME home directory - see control panel, "system" viewer, environment, system variables. Changes to the system variables take effect only after a reboot of the PC.

If only Windows NT/2000/XP PC’s with Demetra will access the server with Fame databases, this installation is not necessary anymore since version 2.0 (Service Pack 1). The server programme will automatically be executed locally at each PC.

1. Login:

⇒ Login into your Windows NT PC as "administrator" or user with administrator rights

2. Uninstall previous SUN RPC application versions (as included in Demetra) if necessary:

Perform the following steps only if you previously installed and used the SUN RPC application (portmapper) on Windows NT PC's to get access to its FAME databases:

⇒ Open the "Services" viewer in the control panel
⇒ Check that the "Portmapper" service is installed (if not listed, you can stop here)
⇒ Stop the "Portmapper" service
⇒ Close the "Services" viewer
⇒ Open the "Add/Remove Programs" function in the control panel
⇒ Uninstall the "Portmap" programme
⇒ Close the "Add/Remove Programs" function
⇒ Delete the subdirectory "Win NT" in the home directory of Demetra (e.g. "C:\Program Files\Demetra")
⇒ Reboot the PC and login as yourself (usual login and password) if necessary

3. Stop the old " Portmap Service (Demetra)..." and "Demetra Fame Server" services:

⇒ Open the "Services" viewer in the control panel
⇒ Stop the "Demetra Fame Server" service if installed (listed)
⇒ Stop the "Portmap Service (Demetra)..." service if installed (listed)
⇒ Close the "Services" viewer

4. Uninstall previous versions of Demetra:

⇒ Open the "Add/Remove Programs" function in the control panel
⇒ Uninstall the "Demetra" programme if listed
⇒ Close the "Add/Remove Programs" function
⇒ Delete the Demetra home directory
⇒ Delete the programme group/icons (if manually created)

5. Execute the file "**Demetra_Install.exe**" and follow the instructions on the screen.

6. Install the "Portmap Service (Demetra)..." service if it was not listed in the "Services" viewer:

⇒ Open an MS-DOS session with the "Commant Prompt"
⇒ Install the new portmap service with "**portmap -install**" in the home directory of Demetra (e.g. type "C:\Program Files\Demetra\portmap -install")
⇒ Exit the MS-DOS session (e.g. type "Exit" in the shell window)

7. Install the "Demetra Fame Server" service if it was not listed in the "Services" viewer:

⇒ Open an MS-DOS session with the "Commant Prompt"
⇒ Install the "Demetra Fame Server" service with "**FameNTSvc -install**" in the home directory of Demetra (e.g. type "C:\Program Files\Demetra\FameNTSvc -install")
⇒ Exit the MS-DOS session (e.g. type "Exit" in the shell window)

8. Start the new "Portmap Service (Demetra)..." and "Demetra Fame Server" services:

⇒ Open the "Services" viewer in the control panel
⇒ Start the "Portmap Service (Demetra).." service
⇒ Start the "Demetra Fame Server" service
⇒ Close the "Services" viewer

9. Reboot:

⇒ Reboot the PC and login as yourself (usual login and password)

2.4. Installation of the “Demetra Fame Server” on a remote UNIX (e.g. Solaris SunOS) server allowing a Windows XP/2000/NT/Me/98/95 PC the access to its FAME databases

Remark: FAME version 8/9 must previously have been installed on the UNIX server.

1. Login:

⇒ Login into your UNIX system as superuser (root).

2. Create a link in the directory "/etc/init.d" called "**Demetra**": /etc/init.d/Demetra:

⇒ contents of the Demetra script: (FAME has been installed in "/opt/fame" in this example)

```
#! /bin/sh -p
#set -x
#ident  "@(#)Demetra_server  x.x     99/18/01 "
#
# start/stop the Demetra_server deamon

#       cron control
pid=`/usr/bin/ps -e | /usr/bin/grep Demetra | /usr/bin/sed -e 's/^  *//' -e 's/
.*//'`

case "$1" in

'start')
        . /opt/Demetra/dmtenv
        # Start the Demetra_server deamon
        if [ -d /opt/fame ] ; then
                echo "starting Demetra_server"
                /opt/Demetra/Demetra_server &
        fi
        ;;

'stop')
        # Stop the Demetra_server deamon
        if [ "${pid}" != "" ]
        then

                echo "stopping Demetra_server"

                    /usr/bin/kill ${pid}
        fi
        ;;
*)
        echo "usage: /etc/init.d/Demetra {start|stop}"
        ;;

esac
```

3. Create a link in "/etc/rc2.d" so that the programme is started at each boot.

```
lrwxrwxrwx  1 root  root   19 Sep 15 17:24 S75Demetra -> /etc/init.d/Demetra
```

Note: The "Demetra_server" programme can also be started and stopped manually by a non-superuser:

⇒ Type the following to start the Demetra FAME service on UNIX:
/etc/init.d/Demetra start

⇒ Type the following to stop the Demetra FAME service on UNIX:
/etc/init.d/Demetra stop

4. Install the Demetra UNIX FAME server:

⇒ Copy the programme "**Demetra_server**" on the server in the directory "/opt/Demetra": /opt/Demetra/Demetra_server

Note: You can find this programme in the subdirectory "Demetra unix servers" on the installation CD-ROM. Version is available for UX-HP 11.0. Additional versions could be made available upon request through contact information at http://forum.europa.eu.int/Public/irc/dsis/eurosam/home.

5. Create a file in the directory "/opt/Demetra" called "**dmtenv**": /opt/Demetra/dmtenv

⇒ Contents of dmtenv script: (FAME has been installed in "/opt/fame" in this example)

```
FAME=/opt/fame
      export FAME
```

6. Check with "rpcinfo" to see if the Demetra UNIX FAME server is running:

---> Type "rpcinfo". You should get something like (also as non-superuser possible):

```
program version netid     address              service    owner
    100000    4    ticots    dhaene.rpc           portmapper superuser
 824395639    1    udp       0.0.0.0.148.70       Demetra    superuser
 824395639    1    tcp       0.0.0.0.153.24       Demetra    superuser
 824395639    1    ticlts    \000\000\021\305     Demetra    superuser
 824395639    1    ticotsord \000\000\021\310     Demetra    superuser
 824395639    1    ticots    \000\000\021\313     Demetra    superuser
```

Note: In principal, "Demetra_server" could also be installed as an inetd service.

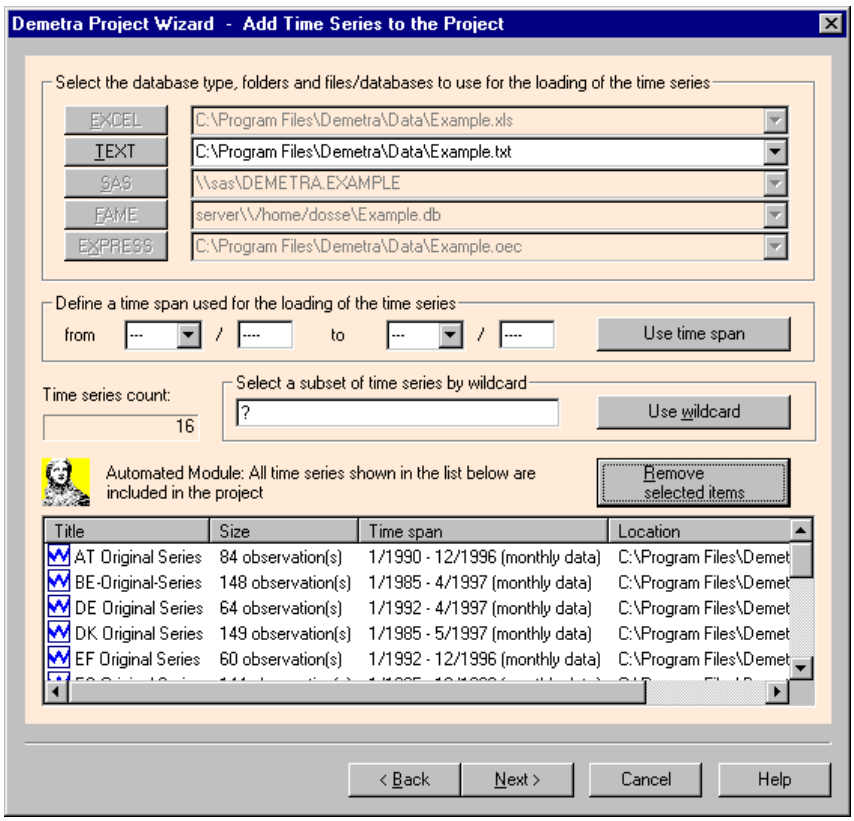
Chapter 3 :

Description of the automated module

3.1. Demetra Project Wizard

3.1.1. Selection of the input database

After your decision for one of the two modules of Demetra (automated module or module for detailed analysis of single time series) you will be asked to enter your selection of the time series (or lists of time series) for input.



Demetra currently provides access to time series in formatted TEXT, MS-EXCEL files, FAME, SAS or ORACLE EXPRESS databases. Choose one of the corresponding buttons to select your data. See below for special information on the input from these databases.

> *Remark: In one Demetra project, you can only use one type of database. Once you have selected time series from one type of database you will not be able to add other time series from another database type and vice versa.*

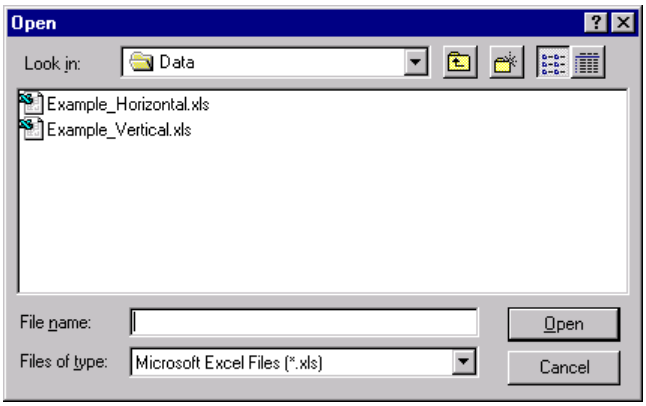
It is possible to delete some of the selected time series (or FAME lists of time series) by highlighting them and using the "Remove selected items" button.

You can also define a sub-range of the time span to which all chosen series will be limited: Just enter a personalised starting period/year and/or ending period/year. However, you can not change the periodicity of any time series.

Demetra automatically searches for stored parameters sets (if they have been previously saved by Demetra) and loads them too. The format for the storing of the parameters must be respected if you perform manual modifications in the databases. For more details, see page 107: Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output).

3.1.2. Input from text files and from MS-Excel files

Demetra provides access to structured ASCII text files and to MS-EXCEL files. To know more about the creation and structure of these files, see page 101: Format of the ASCII data files (input and output), respectively page 104: Format of the MS-EXCEL files (input and output).



In the both file types, the time series are identified by their names. While loading the time series, Demetra searches for the characteristics of the data (data periodicity, starting period/year, ending period/year, number of observations) and the time series data themselves. All time series contained in the selected file are loaded.

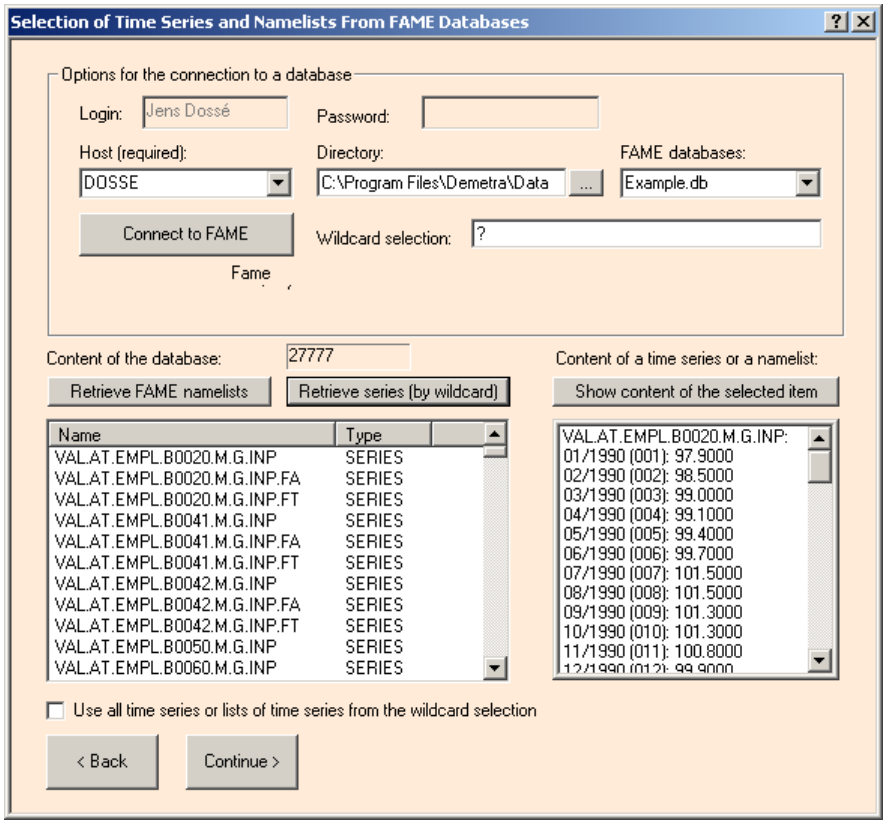
A possibility to easily select sub-sets of time series in an ASCII text file or an EXCEL file is given by the wildcard selection option. Type a wildcard name by using the letters that are the same in all time series to be selected. Letters that can be different from one time series to another must be replaced by the symbol '^'. Any chain of letters after a certain position in the time series names can be replaced by ending the wildcard name at this position with the question mark '?'.

Example:
An Ascii text file contains the following time series: ABC, ABCDEF, ABCXYZ and XYZDXF.
The wildcard name '*ABC*^^^' will select ABCDEF and ABCXYZ.
The wildcard name '^^^*D^F*' will select ABCDEF and XYZDXF.
The wildcard name '*ABC?*' will select ABC, ABCDEF and ABCXYZ.

Tip: To easily copy a long name of a time series from the series list to the wildcard edit box just move the mouse over the time series name and click on the right mouse button.

3.1.3. Input from Fame databases

You can select the time series, formulas and the lists of time series from FAME databases on your local PC, or on any remote machine where FAME is installed. The dialog provides edit boxes for the entering of the (remote or local) host, directory, database, and of any subset of the time series (for UNIX servers a login and password are needed):



Note: All UNIX connection parameters are CASEsensitive. Take care with CAPITEL or small letters.

FAME gives the possibility to create lists of time series ("namelists") that can be used to easily select subsets of time series from a FAME-database. This facility can be applied in Demetra for the selection of large-scale sets of time series by selecting just one single list containing the names of these time series.

Remark: You can not select both FAME types (time series and lists of time series) at the same time in one project. If you add a different type of input to your project, previously selected items will automatically be discarded. However, it is possible to select time series (respectively lists of time series) from different databases in one project. Also, the result time series could be saved into different databases if they are already indicated in the processing options of the original time series (See page 98: Format for the storing of parameters in the FAME databases). In this case, the series must already have been adjusted once before.

Another possibility to easily select large sets of time series is given by the wildcard selection option that just works as its equivalent function in FAME. Type a wildcard name by using the letters that are the same in all time series to be selected. Letters that can be different from one time series to another must be replaced by the symbol '^'. Any chain of letters after a certain position in the time series names can be replaced by ending the wildcard name at this position with the question mark '?'.

Example:
A Fame database contains the following time series: ABC, ABCDEF, ABCXYZ and XYZDXF.
The wildcard name '*ABC^^^*' will select ABCDEF and ABCXYZ.
The wildcard name '*^^^D^F*' will select ABCDEF and XYZDXF.
The wildcard name '*ABC?*' will select ABC, ABCDEF and ABCXYZ.

Tip: To easily copy a long name of a time series from the series list to the wildcard edit box just move the mouse over the time series name and click on the right mouse button.

To verify your selection use the bottom "Show contents of a selected item" (or double-click on an item) that allows viewing the data of a time series or the list of time series in a Fame namelist.

In the series view, highlight all the items (time series and formulas, or namelists) you want to treat with Demetra and accept your choice by clicking on "Continue". If your wildcard returns exactly the series wanted, than check the box "Use all time series or lists of time series from the wildcard selection" on the bottom of the screen. This will disable the series view and accept the complete selection when you click on the "Continue" button.

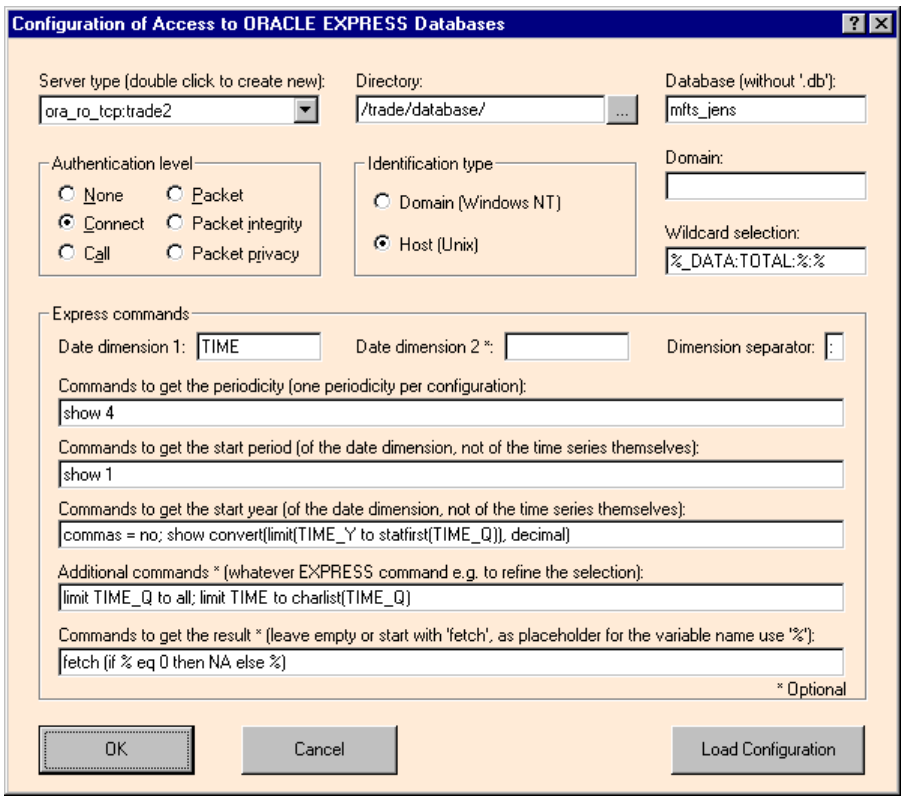
Clicking on the "Continue" button brings you back to the former screen showing your selection.

If the total number of selected items exceeds 1000, Demetra proposes to build a special project for "very large-scale" datasets. If you accept, Demetra will not load the time series data themselves immediately. The series will be loaded one by one during the seasonal adjustment processing or for the graph display, and unloaded after their use. That allows for a minimal memory use and reduced waiting times. However, you will not be able to graph the result time series as these are immediately saved to the result database and cleared from the memory.

3.1.4. Input from Oracle Express databases

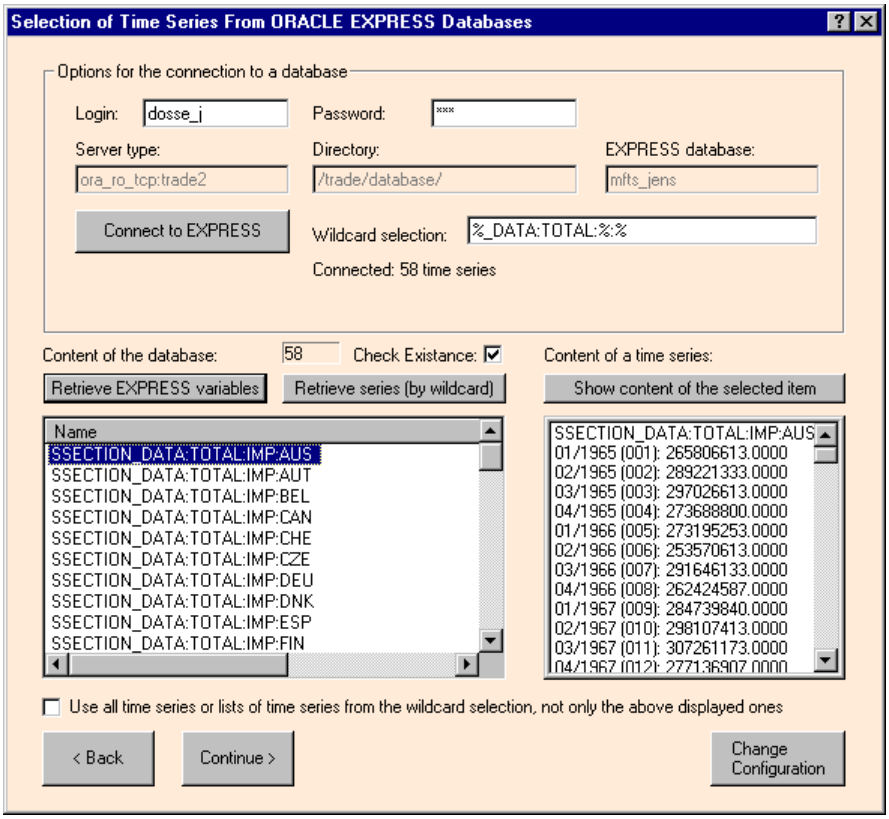
You can select the time series from ORACLE EXPRESS databases on your local PC, or on any remote machine where EXPRESS is installed.

For at least each database and time series periodicity, you need to set up a special configuration (button "Change Configuration") that will be saved into an Express Configuration file. This file must not change the name or place since Demetra will access it while you are working with the project.



The dialog provides edit boxes for the entering of the (remote or local) host, directory, database, and of any subset of the time series (for UNIX servers at least a login and password are required):

Note: All UNIX connection parameters are CASEsensitive. Take care with CAPITEL or small letters.



Following naming convention is used in Demetra:
The time series name starts with the name of the corresponding Express variable or formula followed by the corresponding dimension values that all separated from each other by a chosen delimiter (default: ":").

A possibility to easily select large sets of time series is given by the wildcard selection option that just works as its equivalent function in EXPRESS. E.g. single characters can be replaced by '_' while a chain of letters can be replaced by '%'.

> *Tip: To easily copy a long name of a time series from the series list to the wildcard edit box just move the mouse over the time series name and click on the right mouse button.*

To verify your selection use the bottom "Show contents of a selected item" (or double-click on an item) that allows viewing the data of a time series or formula.

In the series view, highlight all the items (time series and formulas) you want to treat with Demetra and accept your choice by clicking on "Continue". If your wildcard returns exactly the series wanted, than check the box "Use all time series or lists of time series from the wildcard selection" on the bottom of the screen. This will disable the series view and accept the complete selection when you click on the "Continue" button.

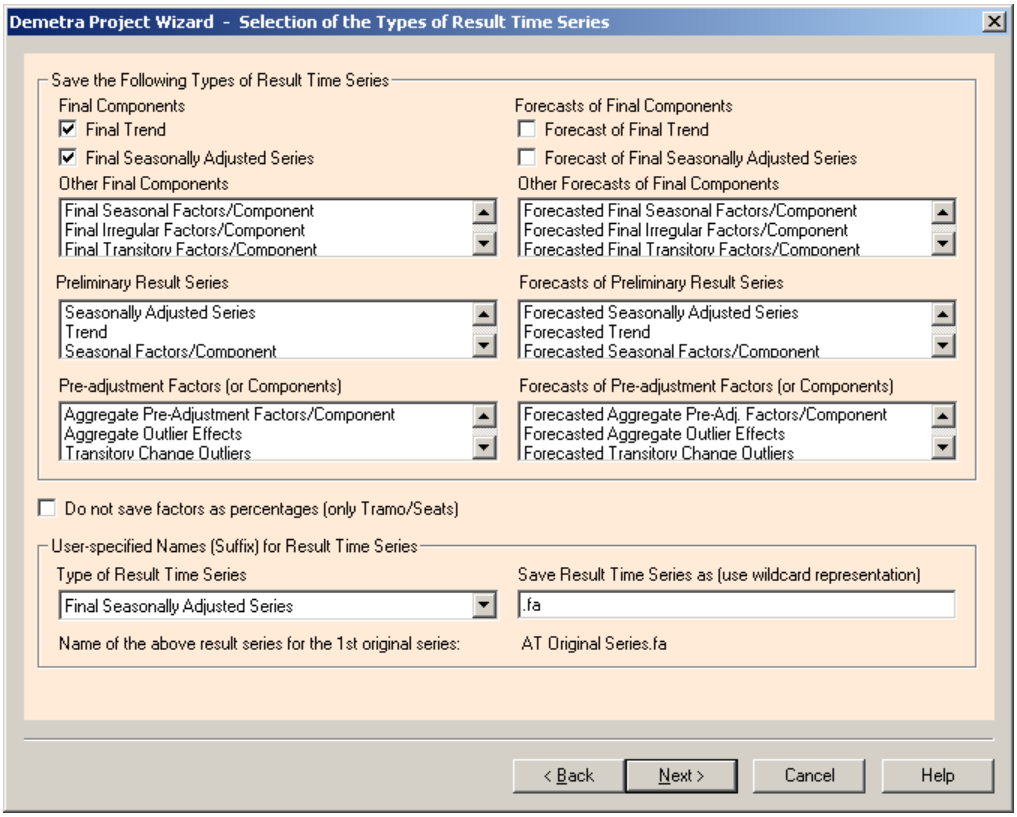
Clicking on the "Continue" button brings you back to the former screen showing your selection.

If the total number of selected items exceeds 1000, Demetra proposes to build a special project for "very large-scale" datasets. If you accept, Demetra will not load the time series data themselves immediately. The series will be loaded one by one during the seasonal adjustment processing or for the graph display, and unloaded after their use. That allows for a minimal memory use and reduced waiting times. However, you will not be able to graph the result time series as these are immediately saved to the result database and cleared from the memory.

3.1.5. Selections for the types and names of result time series

The result time series are the series that can be produced by the SA-methods, like the seasonally adjusted series or the trend series.

Demetra provides list boxes to select the result time series to be saved to the result database or result data file. You can select more than one list-box item (result time series) at a time. The SHIFT and CTRL keys can be used together with the mouse to select and deselect items, including non-adjacent items. Clicking or double-clicking an unselected item selects it. Clicking or double-clicking a selected item deselects it.



Attention: The selection of a result time series does not mean that this series will necessarily be saved to the database/file. The SA-methods Tramo/Seats and X-12-Arima only produce the results that correspond to the regression- and ARIMA-model used (factors or components that represent the effects/terms included in the model). Only these results can be saved to the database/data file. Missing results are therefore (in most cases) not an error of Demetra.

A special option allows transforming the decomposed factors from Seats (for multiplicative modelling) from percentages (values around 100) to ratios (values around 1).

At the bottom of the dialog, an edit box is provided for customising the suffixes of the names of the result time series used for the saving. First choose the type of result time series in the left combo box, then modify the corresponding suffix that are proposed to you using the right edit box. The default construction rule of the names consists in adding a default suffix to the name of the original time series. See below for a list of default suffixes. To give you an idea how the name will look like, an example is shown below the edit box using the first original time series and the currently selected type of result time series.

Tip: Starting the customised suffix by "#" means deleting letters at the end of the name of the original time series before adding the suffix. This can be useful if a suffix specifying an original series should be replaced by a suffix specifying a result time series.

Remark: The default respectively user-defined names of the result time series as shown in this dialog are not applied in the case if suffixes (memorised in a previous run) are found in parameter list in the database.

Example:
- name of the original series: "MYSERIES.ORIG", default suffix of trend series: ".ft", resulting name of the trend series: "MYSERIES.ORIG.ft"
- name of the original series: "MYSERIES.ORIG", user-defined suffix of trend series: "####TREND", resulting name of the trend series: "MYSERIES.TREND"

For express databases, the constructions of the names of the result time series are a bit different. You can change the name of the result variable name and/or of the dimensions items.

List of default suffixes:

Result time series	*Default suffix*
Final Components	
Final Seasonally Adjusted Series	.fa
Final Trend	.ft
Final Seasonal Factors/Component	.fs
Final Irregular Factors/Component	.fi
Final Transitory Factors/Component	.fc
Business Cycle (from Hodrick-Prescott filter)	.b
Final Long-Term Trend (from Hodrick-Prescott filter)	.fl
Business Cycle (from H-P filter) + Irregular	.bi
Forecasted Final Components	
Forecasted Final Seasonally Adjusted Series	.ft_f
Forecasted Final Trend	.ft_f
Forecasted Final Cyclical Factors (Comp.)	.fc_f
Forecasted Final Seasonal Factors (Comp.)	.fs_f
Forecasted Final Irregular Factors (Comp.)	.fi_f
Fcstd. Business Cycle (from Hodrick-Prescott filter)	.b_f
Fcstd. Final Long-Term Trend (from Hodrick-Prescott filter)	.fl_f
Fcstd. Business Cycle (from H-P filter) + Irregular	.bi_f
Forecasted Original Uncorrected Series	.o_f
Preliminary Result Series	
Seasonally Adjusted Series	.a
Trend	.t
Cyclical Factors (Component)	.c
Seasonal Factors (Component)	.s
Irregular Factors (Component)	.i
Linearised series	.l
Residuals	.res
Interp. Series Corr. for Calendar Effects	.omce
Standard Error of Seasonally Adjusted Series	.sea
Standard Error of Trend	.set
Standard Error of Seasonal Factors/Component	.ses
Standard Error of Transitory Factors/Component	.sec
Forecasted Preliminary Result Series	
Forecasted Seasonally Adjusted Series	.a_f
Forecasted Trend	.t_f
Forecasted Cyclical Factors (Component)	.c_f
Forecasted Seasonal Factors (Component)	.s_f
Pre-adjustment Factors (or Components)	
Aggregate Pre-Adjustment Factors (Component)	.p
Aggregate Outlier Effects	.po
Transitory Changes	.ptc
Level Shifts	.pls
Aggregate Trading Day Effects	.pt
Easter Effect	.pse
Non-Alloc. User-Regr. Effects (Sep. Comp.)	.pun
User-Regr. Effects Allocated to Seas. Comp.	.pus
User-Regr. Effects Allocated to Trend	.put
User-Regr. Effects Allocated to Irreg. Comp.	.pui
User-Regr. Effects Allocated to Seas. Adj. S.	.pua
User-Regr. Effects Allocated to Cycle	.puc

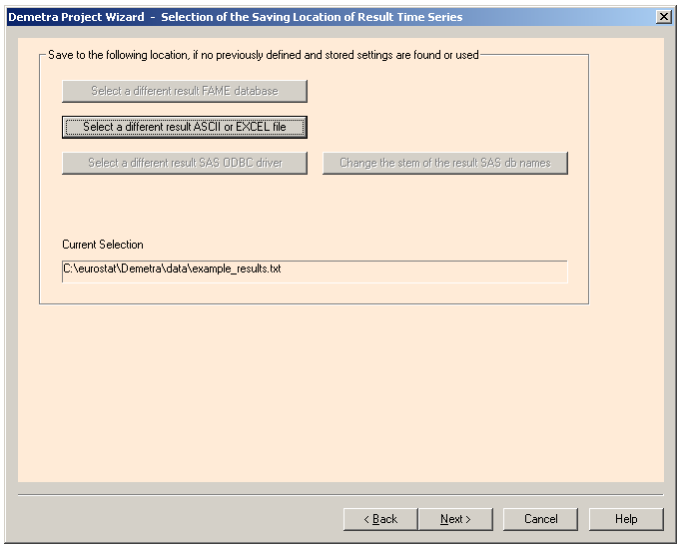
Forecasted Pre-Adjustment Factors (or Components)	
Forecasted Aggregate Pre-Adj. Factors (Comp.)	.p_f
Forecasted Aggregate Outlier Effects	.po
Forecasted Transitory Changes	.ptc_f
Forecasted Level Shifts	.pls_f
Forecasted Aggregate Trading Day Effects	.pt_f
Forecasted Easter Effect	.pse_f
Fcstd. Non-Alloc. User-Regr. Effects (Sep. Comp.)	.pun_f
Fcstd. User-Regr. Effects Alloc. to Seas. Comp.	.pus_f
Fcstd. User-Regr. Effects Alloc. to Trend	.put_f
Fcstd. User-Regr. Effects Alloc. to Irreg. Comp.	.pui_f
Fcstd. User-Regr. Effects Alloc. to Seas. Adj. S.	.pua_f
Fcstd. User-Regr. Effects Alloc. to Cycle	.puc_f

3.1.6. Selection of the output database

You can browse the location (host, directory) and name of databases/files into that the result time series are to be saved. The type of the result databases/files (FAME, ASCII, EXCEL, ORACLE) depends on the type of the input database/file. It can therefore not be chosen by the user. By default, Demetra proposes the following result database/file...

- ... for FAME: the database that is used for the input (see page 19: Selection of time series for input),
- ... for MS-EXCEL: the file that is used for the input (but with a sheet named "Demetra_Results") and
- ... for ASCII: a new text file whose name is constructed by the name of the input data file extended by the letters "_results".
- ... for SAS: a new SAS database whose name is constructed from the name of the input database with a special extension.
- ... for EXPRESS: the Express configuration file that is used for the input.

Remark: The (default respectively user-defined choice for the) location of the result time series as shown in this dialog are not applied in the case when a parameter set with different saving settings was previously memorised in the input database/file, and when the corresponding check box (titled "Save to the same location as at the previous processing") in the later following dialog "Statistical Tool" is clicked.



3.1.7. Rules for the quality check

Demetra automatically detects unsatisfying results (according to the default or user-defined decision rules) that can be further treated in the Assisted treatment of rejected adjustments (see page 55). You can select the diagnostic statistics that the interface should use to control the quality of adjustment and to create the list of rejected adjustments, and their significance levels, the number of outliers which will be accepted, etc. as described below.

The possible diagnostics for the SA-methods Tramo and Seats are:

Statistics on Residuals:

- **Residual Autocorrelations:**

  Ljung-Box Statistic on two years of autocorrelations.
  Demetra tests if the Ljung-Box statistic is smaller than $\chi^2_{m,\alpha}$. The value $\chi^2_{m,\alpha}$ depends on α and *m*, where *m* is the degree of freedom (2 times the periodicity of the time series minus the number of ARIMA coefficients). You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

  Example:
  If α=5%, the time series has a monthly periodicity (12), and a ARIMA-model with 1 coefficient has been identified (*m*=24-1) then Ljung-Box<35.2 must be satisfied.

  Extract of the table of the χ^2 distribution:

α	*5%*	*2.5%*	*...*	*0.1%*
$\chi^2_{1,\alpha}$	3.84	5.02	...	10.83
$\chi^2_{2,\alpha}$	**5.99**	**7.38**	**...**	**13.8**
...	...	...	...	...
$\chi^2_{23,\alpha}$	35.2	38.1	...	49.7

  Box-Pierce Statistic on first two seasonal lags of autocorrelations.
  Demetra tests if the Box-Pierce statistic is smaller than $\chi^2_{2,\alpha}$. The value $\chi^2_{2,\alpha}$ only depends on α. You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

- **Residuals Independence:**

  Ljung-Box Statistic on two years of autocorrelations of squared residuals.
  Demetra tests if the Ljung-Box statistic is smaller than $\chi^2_{m,\alpha}$. The value $\chi^2_{m,\alpha}$ depends on α and *m*, where *m* is the degree of freedom (2 times the periodicity of the time series minus the number of ARIMA coefficients). You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

  Box-Pierce Statistic on first two seasonal lags of autocorrelations of squared residuals.
  Demetra tests if the Box-Pierce statistic is smaller than $\chi^2_{2,\alpha}$. The value $\chi^2_{2,\alpha}$ only depends on α. You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

Description of the Residuals:

- **Residuals Normality:**

  Normality test.
  Demetra tests if the Normality statistic is smaller than $\chi^2_{2,\alpha}$. The value $\chi^2_{2,\alpha}$ only depends on α. You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

- **Residual Asymmetry:**

  Skewness (3rd central moment).

  Demetra tests if the Skewness statistic is inside the interval $(-z_{\alpha/2}\sqrt{\frac{6}{n}}, z_{\alpha/2}\sqrt{\frac{6}{n}})$. The standard error $(\sqrt{\frac{6}{n}})$ is produced by Tramo and Seats, where *n* is the length of the time series. The value $z_{\alpha/2}$ only depends on α. You can select between different probabilities α (e.g. 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

  Example:
  If α=5% and the time series has a length of 80 observations (*n*=80) then I Skewness I<0.537=1.96$\sqrt{\frac{6}{80}}$ must be satisfied.

  Extract of the table of the normal distribution:

α	*10%*	*5%*	*2.5%*	...
$z_{\alpha/2}$	1.645	1.96	2.241	...

- **Kurtosis of Residuals:**

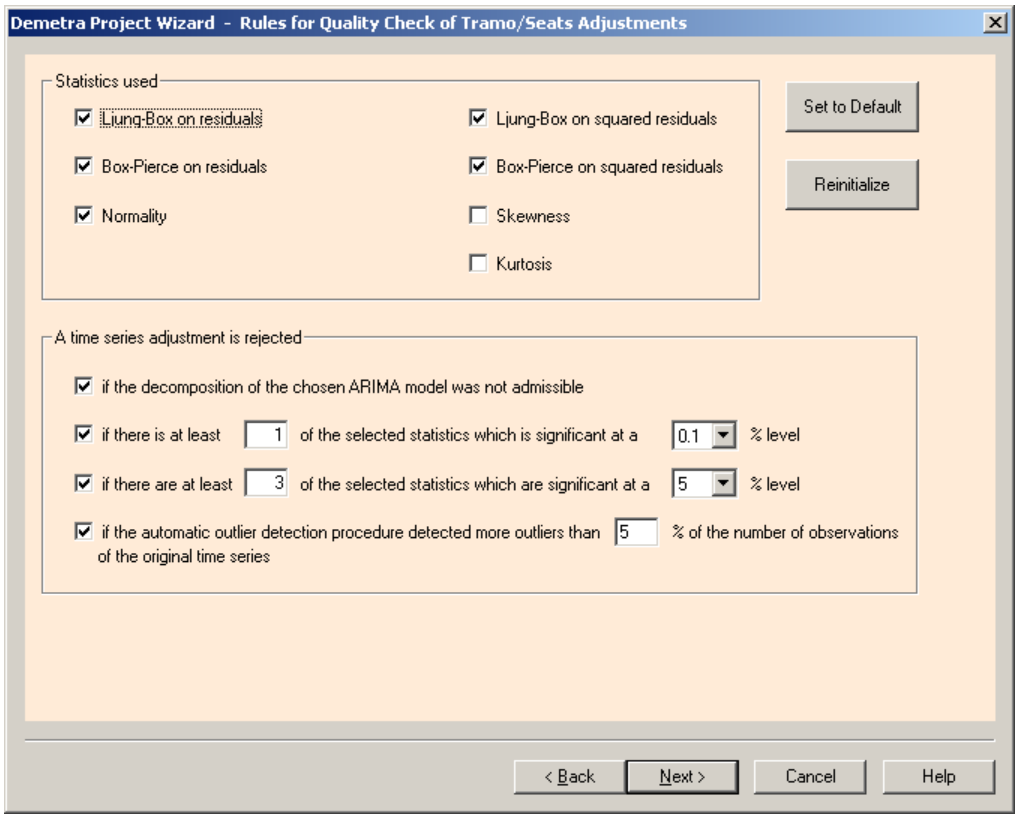
  Kurtosis (4th central moment).

  Demetra tests if the Kurtosis statistic is inside the interval $(-z_{\alpha/2}\sqrt{\frac{24}{n}}+3, z_{\alpha/2}\sqrt{\frac{24}{n}}+3)$. The standard error $(\sqrt{\frac{24}{n}})$ is produced by Tramo and Seats, where *n* is the length of the time series. The value $z_{\alpha/2}$ only depends on α. You can select between different probabilities α (e.g. 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

Number of Outliers:

- Test for the **number of outliers**.
  The number of outliers is counted by Demetra and should not exceed a certain percentage of the total number of observations.

You can use any of the previous statistics as criterion for the quality check according to the following decision rules:



By default, the interface uses the five statistics both Ljung-Box, both Box-Pierce and the Normality statistic based on the χ^2 distribution for the decision rules 2 and 3:

2 There is at least one of these five statistic (called S) for which: $S > \chi^2_{m,0.001}$.

3 There are at least three of these five statistics (called $S_i, i = 1,2,3$) for which: $S_i > \chi^2_{m_i,0.05}, \forall i$.

The possible diagnostics for the SA-method X-12-Arima are:

Modelling:

- Missing **ARIMA model**.
  Demetra verifies that X-12-Arima had chosen an ARIMA model from the limited list of models. The list of default ARIMA models is stored in the file "x12a.mdl" in the root directory of Demetra, and directly accessed by the SA method. It consist of the following models:
  (0 1 1)(0 1 1)
  (0 1 2)(0 1 1)
  (2 1 0)(0 1 1)
  (0 2 2)(0 1 1)
  (2 1 2)(0 1 1)
  In automatic mode, X-12-Arima estimates all available ARIMA models on the series, tests the diagnostic statistics (e.g. size of within-sample forecasts, test for overdifferencing) and eliminates all unsatisfying models. Hence, it is possible that none of the available models fulfil the tests. Then, no forecasts are calculated, and the decomposition is done on the unextended series using asymmetric decomposition filters with less quality.
  An ARIMA model in the model file marked with a star "*" means that this model is used for the pre-adjustment (estimation of calendar effects and outliers) even if no ARIMA model was chosen.

Statistics on Residuals:

- **Residual Autocorrelations:**

  Ljung-Box Statistic on two years of autocorrelations.
  Demetra tests if the Ljung-Box statistic is smaller than $\chi^2_{m,\alpha}$. The value $\chi^2_{m,\alpha}$ depends on α and *m*, where *m* is the degree of freedom (2 times the periodicity of the time series minus the number of ARIMA coefficients). You can select between different probabilities α (e.g. between 10%, 5%, 2.5%, 2%, 1%, 0.5%, 0.2% or 0.1%).

  Example:
  If α=5%, the time series has a monthly periodicity (12), and a ARIMA-model with 1 coefficient has been identified (*m*=24-1) then Ljung-Box<35.2 must be satisfied.

  Extract of the table of the χ^2 distribution:

α	*5%*	*2.5%*	*...*	*0.1%*
$\chi^2_{1,\alpha}$	3.84	5.02	...	10.83
$\chi^2_{2,\alpha}$	**5.99**	**7.38**	**...**	**13.8**
...	...	...	...	...
$\chi^2_{23,\alpha}$	35.2	38.1	...	49.7

Forecast Error:

- Size for the average percentage standard **error in within-sample forecasts** over the last year.

  The interface tests if this value is smaller than α. The user can select between different limits α (e.g. between 20%, 15%, 10%, 5%). This test is also used for the choice of the ARIMA model: The one is chosen with the smallest forecast error.

Number of Outliers:

- Test for the **number of outliers**.

  The number of outliers is counted by Demetra and should not exceed a certain percentage of the total number of observations.

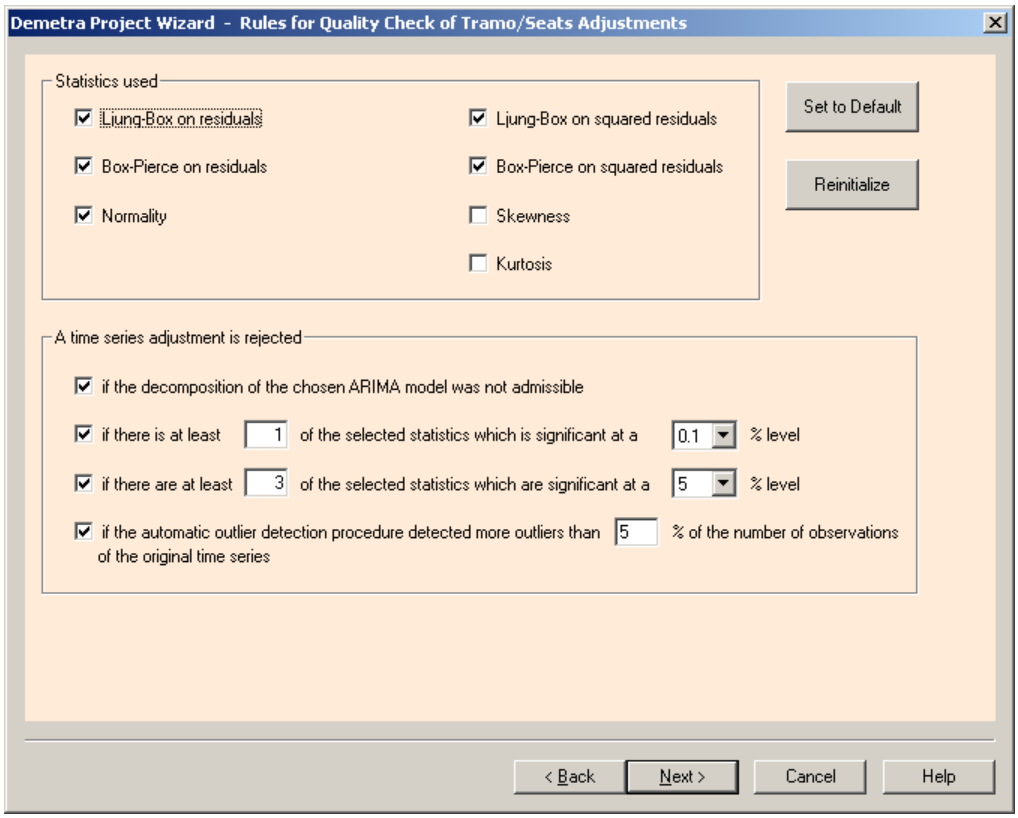
Ad-hoc statistics:

- Combined **Q statistic** (combining M1 and M3 to M11).

  The developers of X-12-Arima elaborated 11 ad-hoc quality assessment statistics that are all in the range from 0 to 3 with an acceptance region from 0 to 1:
  1. The relative contribution of the irregular over three months span.
  2. The relative contribution of the irregular component to the stationary portion of the variance.
  3. The amount of month to month change in the irregular component as compared to the amount of month to month change in the trend-cycle.
  4. The amount of autocorrelation in the irregular as described by the average duration of run.
  5. The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular.
  6. The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal.
  7. The amount of moving seasonality present relative to the amount of stable seasonality.
  8. The size of the fluctuations in the seasonal component throughout the whole series.
  9. The average linear movement in the seasonal component throughout the whole series.
  10. Same as 8, calculated for recent years only.
  11. Same as 9, calculated for recent years only.

The combined Q statistic is also tested for this acceptance region.

You can use any of the previous statistics as criterion for the selection of rejected adjustments according to the following decision rules:



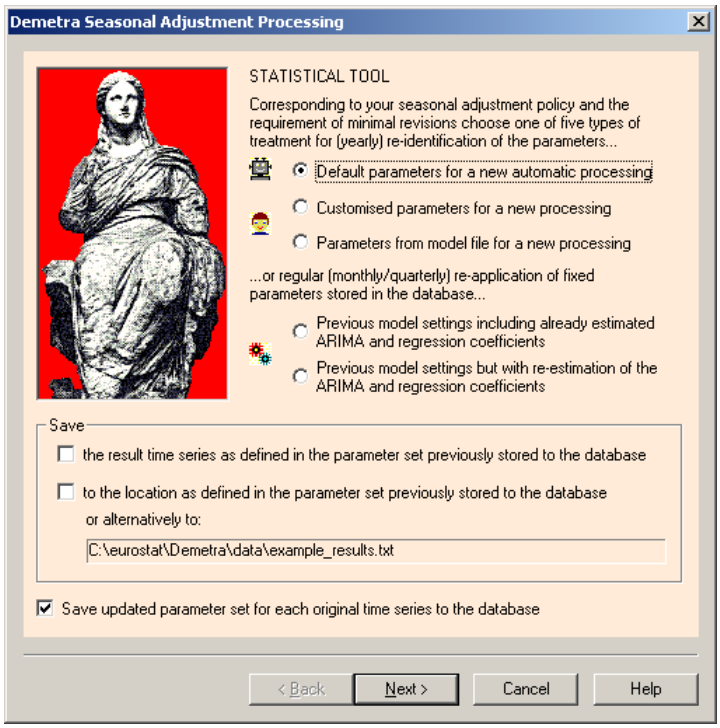
You can customise the diagnostic statistics that the interface should use to control the quality of adjustment and to accept adjustments, and the significance levels, the number of outliers which will be accepted, etc. as described above. Demetra automatically rejects adjustments (according to these default or user-defined decision rules)) that can be further treated in the Assisted treatment of rejected adjustments (see page 55).

Once you have made the selections for the diagnostics statistics to use, Demetra will be able to finish the creation of the project.

3.2. Seasonal Adjustment Processing Wizard

3.2.1. Statistical tools

The automated module contains five different “statistical tools” for the seasonal adjustment of the time series, which correspond to different practices of monthly seasonal adjustment, are described hereafter in more detail:



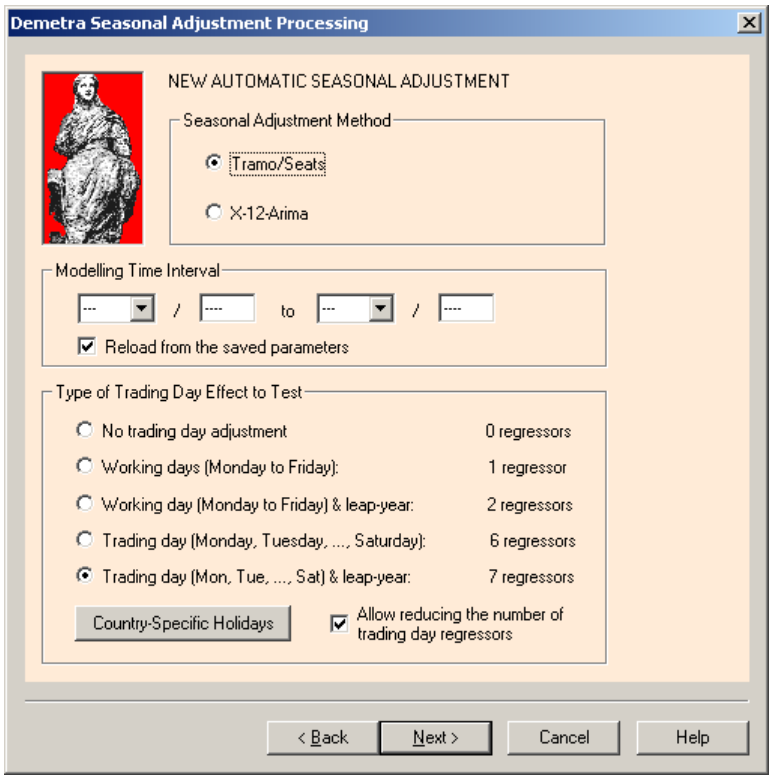
3.2.2. New automatic modelling

This tool will ignore all previous modelling settings and readjust all the time series chosen by a unique and complete set of default automatic modelling parameters for a new seasonal adjustment.

One of the seasonal adjustment methods TRAMO/SEATS or X-12-ARIMA must be chosen. For both of the choices, Demetra defines for all selected time series a complete set of default parameters for a new automatic adjustment. This includes:

- pretests for a logarithm transformation (multiplicative/additive modelling)
- a mean correction (if necessary)
- a new ARIMA model identification/selection and estimation
- pre-tests for Easter and one of 4 different trading day effects (including country-specific holidays)
- an automatic detection and correction for outliers over the whole time series length
- an interpolation of missing observations
- an ARIMA forecast at the end of the series
- an automatic decomposition.

The SA parameters and options are equivalent for all time series in the processed list. The new parameter modalities resulting from the tests and estimations and specific to each time series are returned from the SA-methods to Demetra. The parameter set of accepted adjustments are stored in the database of the original series.



Of course, one of the seasonal adjustment methods TRAMO/SEATS or X-12-ARIMA must be chosen first. The set of default parameters includes:

- pre-test for a logarithm transformation (multiplicative/additive modelling)
- a mean correction (if necessary)
- a new ARIMA model identification/selection and estimation
- pre-tests for Easter and one of four different trading day effects (including country-specific holidays)
- an automatic detection and correction for outliers over the whole time series length
- an interpolation of missing observations
- an ARIMA forecast at the end of the series
- an automatic decomposition.

5 different trading day options are possible:

- No trading day effect
- Test for working day effect: There are no differences in the economical activity between the working days (Monday to Friday) but between these and non-working days (Saturday, Sunday). Hence, the varying number of these days is considered.
- Test for working day and length-of-period effect: As before, but also the total number of days per period is considered.
- Test for trading day effect: There are differences in the economical activity between all days of the week. Hence, the varying number of these days is considered.
- Test for trading day and length-of-period effect: As before, but also the total number of days per period is considered.

Since TRAMO/SEATS and X-12-ARIMA do not decide between these types of trading day effects, either the user must do this choice depending on the mean time series length and on the user's knowledge about the type of time series (e.g. trade, employment, production index, accounts, etc.) or leave the choice up to Demetra (option “Allow reducing the number of trading day regressors”) that is based on the overall quality of the different adjustments.

In general, very short time series should rather be adjusted with few trading day variables (1 or 2), whereas longer time series may be better adjusted using 6 or 7 trading day regressors. In the case of a doubt try several options and decide yourself for the best one (e.g. using the number of rejected adjustments found or the goodness of the diagnostic statistics for each trial) or leave the choice up to Demetra.

The corresponding regression variables are automatically created by the programme that incorporates the calendar for the years from 1901 to 2099. Specific holidays (e.g. depending on regions or

economical activities like banking) may be added by the user.

You can change the modelling time span for TRAMO/SEATS as well as for X-12-ARIMA. Note, that only the model identification and estimation are limited to that span. The series will then be adjusted over its full time span using the fixed model settings.

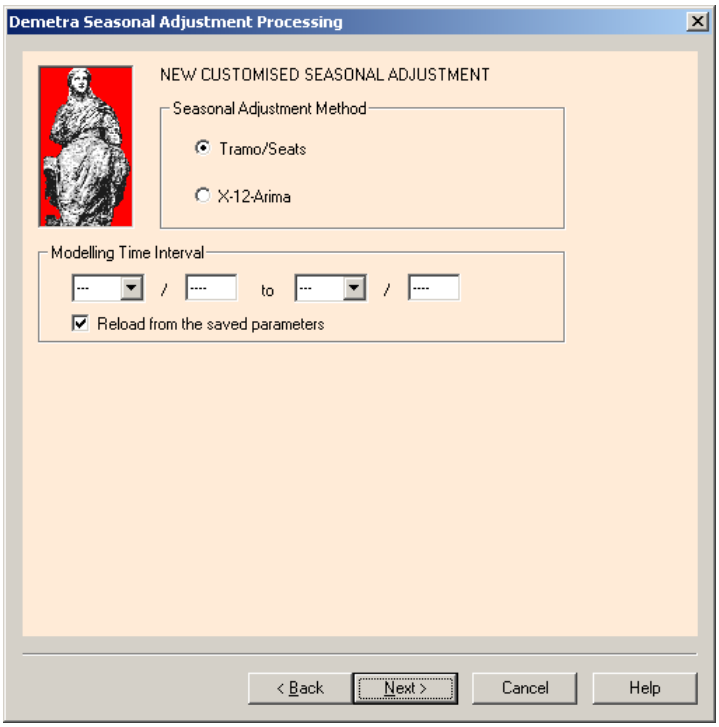
The SA parameters and options are equivalent for all time series in the processed list.

Remark: If your series are stock series then do not use this statistical tool. Use instead the following tool (New customised seasonal adjustment) and set there the corresponding stock trading day option of X-12-ARIMA.

3.2.3. New customised modelling

This tool does basically the same as tool above, but the user can modify or complement the automatic parameters. The modifications to the parameters are the same for all time series in the processed list.

This tool will also ignore all previous modelling settings (except for specific holidays, fixed outliers and user-defined regression variables if wanted so) and readjust all the time series chosen by a unique and complete set of customised modelling parameters for a new seasonal adjustment. The SA parameters and options chosen by the user are applied to all time series in the processed list.



Of course, one of the seasonal adjustment methods TRAMO/SEATS or X-12-ARIMA must be chosen first.
You can change the modelling time span for TRAMO/SEATS as well as for X-12-ARIMA. Note, that only the model identification and estimation are limited to that span. The series will then be adjusted over its full time span using the fixed model settings.

A set of default parameters is proposed to the user that may be changed in a suite of dialog boxes:

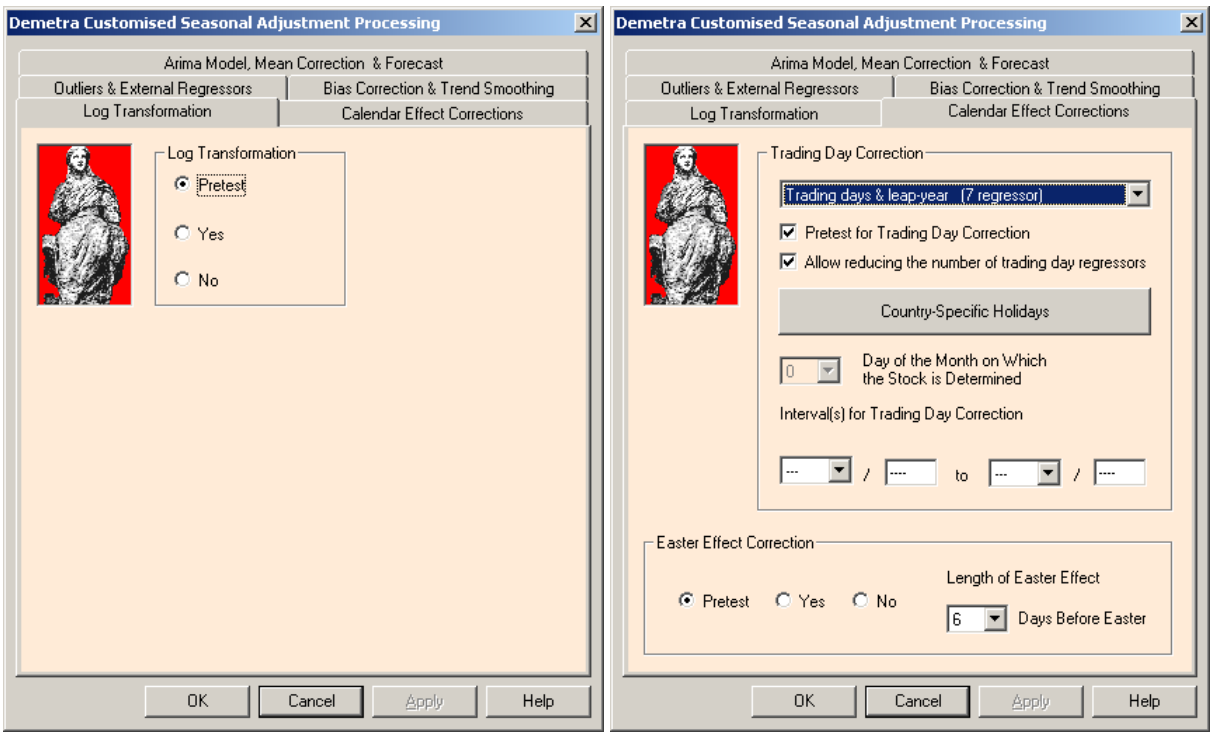
- pre-test for a logarithm transformation (multiplicative/additive modelling)
- a mean correction (if necessary)
- a new ARIMA model identification/selection and estimation
- pre-tests for Easter and one of 4 different trading day effects (including country-specific holidays)

- an automatic detection and correction for outliers over the whole time series length
- an interpolation of missing observations
- an ARIMA forecast at the end of the series
- an automatic decomposition.

Log Transformation:

Transformations can be appropriate if the amplitude of the seasonal fluctuations of the series are correlated to the level of the series. This indicates a multiplicative relationship between the components of the series that can be logarithmically transformed to obtain an additive structure necessary for the decomposition.

- Pre-test: The programme tests for the necessity of a logarithm transformation of the original series (TRAMO: based on a trimmed range-mean regression, complemented with the BIC values, X-12-ARIMA: based on the AICC values). No transformation is performed if a original series contains zeros or negative values.
- Yes: The logarithm transformation is performed if the original series does not contain zeros or negative values.
- No: The logarithm transformation is not performed.



Trading Day Correction:

Many economical activities are strongly influenced by calendar effects like varying number of trading days and holidays in each recorded period. In order to improve the seasonal modelling and the trend estimation, such effects should be eliminated before the decomposition. Five different trading day options are possible:

- No trading day effect
- Working day effect: There are no differences in the economical activity between the working days (Monday to Friday) but between these and non-working days (Saturday, Sunday). Hence, the varying number of these days is considered.
- Working day and length-of-period effect: As before, but also the total number of days per period is considered.
- Trading day effect: There are differences in the economical activity between all days of the week. Hence, the varying number of these days is considered.
- Trading day and length-of-period effect: As before, but also the total number of days per period is considered.

Since TRAMO/SEATS and X-12-ARIMA do not decide between these types of trading day effects, either the user must do this choice depending on the mean time series length and on the user's knowledge about the type of time series (e.g. trade, employment, production index, accounts, etc.) or leave the choice up to Demetra (option “Allow reducing the number of trading day regressors”) that is based on the overall quality of the different adjustments.
In general, very short time series should rather be adjusted with few trading day variables (1 or 2), whereas longer time series may be better adjusted using 6 or 7 trading day regressors. In the case of a doubt try several options and decide yourself for the best one (e.g. using the number of rejected adjustments found or the goodness of the diagnostic statistics for each trial) or leave the choice up to Demetra.
The corresponding regression variables are automatically created by the programme that incorporates the calendar for the years from 1901 to 2099. Specific holidays (e.g. depending on regions or economical activities like banking) may be added by the user.

- Pre-test: The programme tests for the necessity of a correction for trading day (or working day) effects in the original series (TRAMO: by running a regression on the Airline model, X-12-ARIMA: based on the AICC values) using the specified type of trading day effect.
- Yes: The correction for trading day (or working day) effects is performed using the specified type of trading day effect.
- No: A correction for trading day (or working day) effects is not performed.

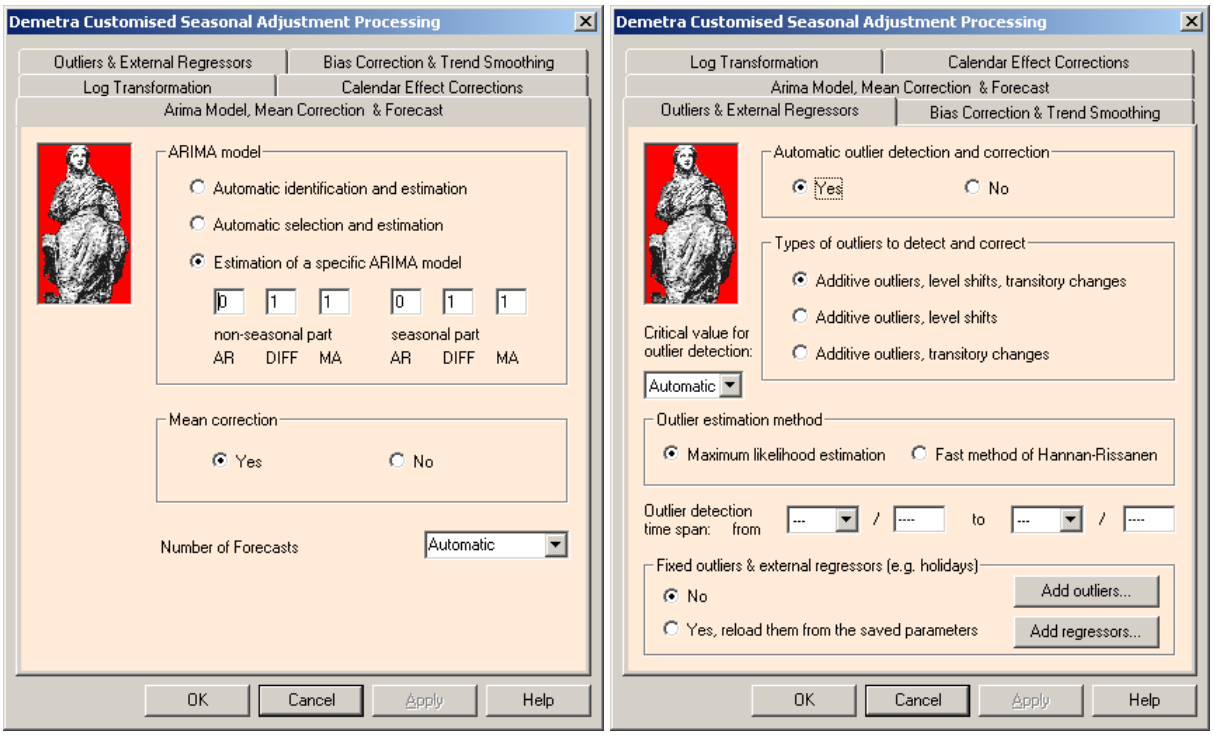
Remark: If your series are stock series then switch off the trading day correction, because the trading day variable for stock series (of X-12-ARIMA) can not be accessed from the automated module. Single stock series can be adjusted for the trading stock effect using X-12-ARIMA in the detailed analysis module.

Easter Effect Correction:

Economical activities can be influenced by the varying number of Easter preceding days (with higher economical activities) that fall in either of the months March and April. In order to improve the seasonal modelling and the trend estimation, such an effect should be eliminated before the decomposition.

The number of Easter affected days per year may be adapted to the type of time series if the user possesses more detailed information on the economical background. However, a default value that results from many practical experiences is given.
The corresponding regression variable is automatically created by the programme that incorporates the calendar for the years from 1901 to 2099.

- Pre-test: The programme tests for the necessity of a correction for the Easter effect in the original series (TRAMO: by running a regression on the Airline model, X-12-ARIMA: based on the AICC values).
- Yes: The correction for the Easter effects is performed.
- No: The correction for the Easter effects is not performed.



ARIMA Model:
An ARIMA model is identified (TRAMO/SEATS) or selected from a list of default models (X-12-ARIMA) and estimated for each time series in order to perform the forecast and (for Tramo/Seats) also the decomposition on the forecasted time series. Alternatively, no identification/selection is done, simply the AIRLINE model (0 1 1)(0 1 1) is estimated. Of course, one expect much better results using specific models adapted to each of the time series. However, under some circumstances the user might want to use the robust AIRLINE model what highly speeds up computer time. In general, very short time series can often sufficiently be well modelled with the AIRLINE model.

- Automatic identification (TRAMO) or selection (X-12-ARIMA) of a time series specific ARIMA model and its estimation
- Estimation of a specific ARIMA model (uses by default the robust AIRLINE model (0 1 1)(0 1 1))

Mean Correction:
The residuals of the ARIMA model are supposed to follow a normal distribution that includes a mean of zero. Hence, a preceding mean correction may be adequate. TRAMO will anyway set this option to "No" if the mean correction is not necessary.

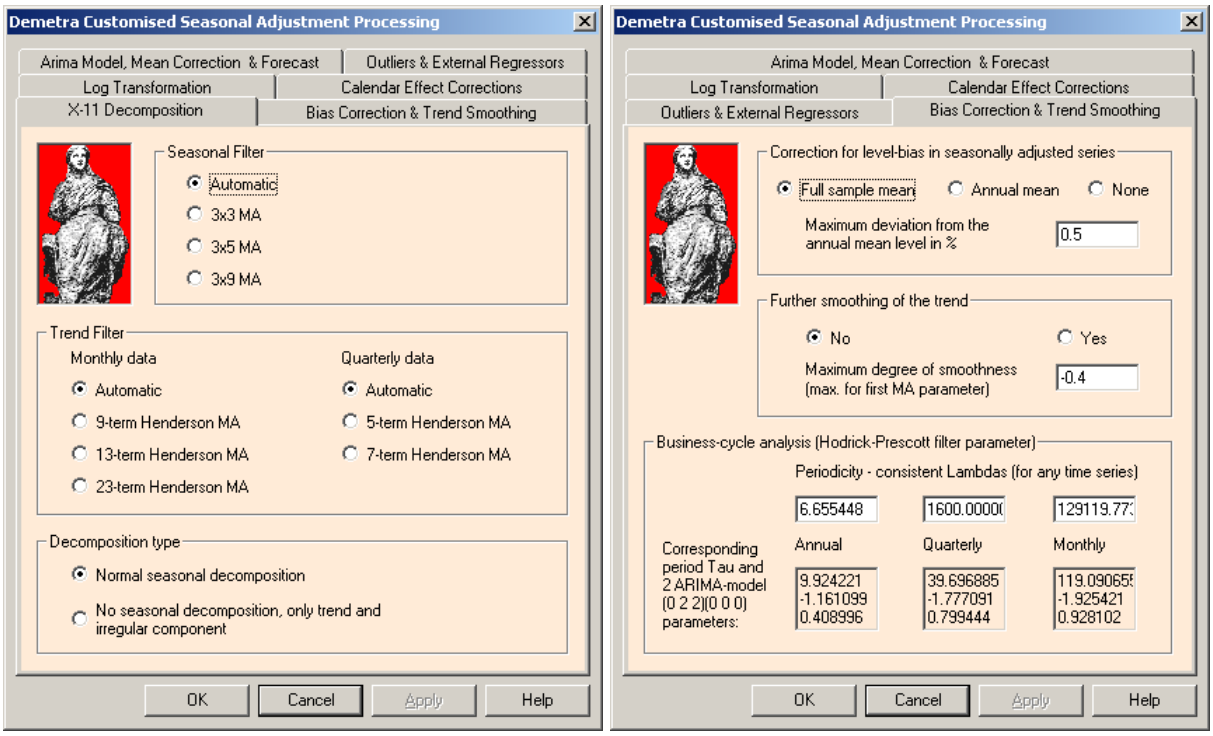
- Yes: Perform a mean correction (for TRAMO: only if necessary)
- No: Do not perform a mean correction

Automatic Outlier Detection and Correction:
The programme has a facility for automatically detecting outliers and for removing their effect. Outliers are "historically unexpected" values (data irregularities) in the time series that result either from real extraordinary economic effects or from the modelling: some few values may not "follow" the ARIMA model chosen and are therefore excluded from the modelling. Unfortunately, often these real extraordinary economic effects are unknown, and the corresponding time series values are often only detected because these fall out of the structure (modelled with the ARIMA technique) contained in the other values.
You can switch on or off the automatic outlier detection and correction using:

- Yes
- No

The outlier detection procedure can be customised for different parameters.
The critical value determines how strong the outlier must break out in order to be considered and

varies from 2.8 (high sensitivity) to 4.1 (low sensitivity). The default (automatic) value is determined by the length of each time series: Shorter the series lower the critical value and vice-versa. Since the outlier detection procedures of TRAMO and X-12-ARIMA are not identical, the default (automatic) values are different too. The critical value may be chosen smaller to increase the number of outliers and thus to improve the residual characteristics of the ARIMA model. It may be chosen higher to reduce the number of outliers in the case that more than 5% of the number of observations are found to be outliers. However, choosing the critical value requires both judgement and experience.
Different types of outliers are considered in the context of seasonal adjustment: additive outliers (AO), transitory change (TC) and level shift (LS). An additive outlier is able to catch a single point jump in the data, a temporary change a single point jump followed by a smooth return to the original path, and a level shift a permanent change in the level of the series. The user may limit the detection to 2 of the 3 outlier types (always including additive outliers).
The outlier estimation methods differ between TRAMO and X-12-Arima. The first one alternatively uses the maximum-likelihood estimation (better results, slower) or the fast method of Hannan-Rissanen. X-12-ARIMA offers also 2 procedures: "add one by one" (The outlier with the highest/insignificant t-statistic is added/removed at one time and the ARIMA model estimated and so on.) and "add all outliers together" (All the significant/insignificant outliers are added/removed at once and the ARIMA model estimated and so on.). The first method generally takes more computation time than the second whereas the second method can easily reach the memory limits by adding to many outliers. Outlier detection results can vary depending on the ARIMA model: observations are classified as outliers because the ARIMA model fits them less well than most of the other observations.
A time span for the outlier detection and correction can be specified. In this case, only the time points of each series falling into this interval are considered in the procedure.
The option for outliers, specific holidays or regressors from previous processing allows to include e.g. outliers suspected at specific, known time points by defining them in the series-specific parameter item in the database (see Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output)) and using the option for (re-)loading them from the saved parameters. Specific holiday and other user-defined regressors may the specified in the same way. This option can also be used, if the annual automated re-adjustment should consider previous outlier and regressors settings.



Decomposition Options for MA-Based Method X-11 (Decomposition Part of X-12-ARIMA):
The seasonal and trend moving averages (also called "filters") used to estimate the seasonal factors and the final trend-cycle can be controlled:
The user can choose between the 3x3, 3x5 and 3x9 seasonal filter or the automatic option that invokes the seasonal filter selection procedure of X-11-ARIMA/88 based on the global moving seasonality ratio. That ratio is computed on preliminary estimates of the irregular component and of

the seasonal. Roughly, large values point to a relative stability of the seasonality and suggest the use of a long seasonal moving average; on the contrary small ratios indicate a relatively unstable seasonality leading to the use of short seasonal moving filters.
The available trend filter choices depend on the periodicity of the time series: quarterly data can be adjusted with the 5- or 7-term Henderson trend filter, and monthly data with the 9-, 13- or 23-term Henderson trend filter. In both cases, an automatic option is available that chooses the filter based on the characteristics of the data (global irregular-cycle-ratio).
Broadly speaking, long filters (high numbers) are adequate for stable seasonal respectively trend movements in the time series while short filters (low numbers) are more appropriate for unstable, fast evolving patterns.
Two types of decomposition can be performed:

- the normal decomposition into trend-cycle, seasonal factors/component and the irregular factors/component. Trend-cycle and irregular factors/component build together the seasonally adjusted series.
- the reduced decomposition without seasonal adjustment: only the trend-cycle is computed leaving apart the irregular factors/component.

Correction for Level-Bias:
The programme can correct for the bias that may occur in multiplicative decomposition when the period-to-period changes are relatively large when compared to the overall mean. This bias implies an underestimation of the seasonally adjusted series and of the trend in levels, caused by the fact that geometric means underestimate arithmetic means. 3 choices for the bias correction are available:

- Full sample mean: A correction is made for the overall bias for the full length of the series and the forecasting period (only with TRAMO/SEATS and only for logarithm transformed series)
- Annual mean: For TRAMO/SEATS, a correction is made so that, for every year (including the forecasting period), the annual average of the original series equals the annual average of the seasonally adjusted series, and also (very approximately) equals the annual average of the trend. For X-12-ARIMA, the seasonally adjusted series will be modified to force the annual totals of the seasonally adjusted series and the original series be the same. The difference between the annual totals is distributed over the seasonally adjusted values in a way that approximately preserves the period-to-period movements of the original series.

  Remark: The bias correction procedure is not recommended if the seasonal pattern is changing or if trading day adjustment is performed.

For TRAMO/SEATS only: When the average value of the differences (in absolute value) between the annual means of the original and seasonally adjusted series is larger than the maximum deviation, the bias correction for annual means is automatically enforced. The maximum deviation to enter is expressed in percent points of the level of the series.

Further Smoothing of the Trend for SEATS:
For the AIRLINE model, a facility has been introduced into SEATS to obtain a smoother trend without significantly affecting the seasonally adjusted series. This is done by simply decreasing the value of the first coefficient of the moving average (MA) factor in the ARIMA model.

- Yes: The trend is further smoothed if necessary: When the first MA coefficient is larger than the maximum value ("degree of smoothness"), it is replaced by this maximum value.
  If the first MA coefficient is smaller than or equal to the maximum value, nothing is done since the trend is already smooth enough.
- No: No further smoothing is done.

Business-cycle analysis (Hodrick-Prescott filter parameter λ):
Specify here the Hodrick-Prescott filter parameter λ for one of the 3 time series periodicities. Demetra will automatically calculate the adequate parameter λ (Lambda) for the other series periodicities.
Even if your time series periodicity is not included in the 3 examples, Demetra will calculate the corresponding parameter:

Practically, Demetra first obtains the equivalent period τ (Tau) that is the maximum length of the cycles

extracted (expressed in number of periods). When you divide this number of periods by the series periodicity (number of periods per year) you obtain the maximum length of the cycles extracted expressed in number of years - that should of course be independent on the time series periodicity.
Second, Demetra calculates the 2 corresponding moving average coefficients for the ARIMA-model (0 2 2)(0 0 0), which is used as Hodrick-Prescott filter.

The default parameter λ (Lambda) for quarterly series is 1600. That value is a "de facto industry standard" (European Central Bank (2000)) that corresponds to a maximum cycle length of about 10 years. The derivation of periodicity-consistent λ's (Lambda) and the ARIMA model coefficients is described in "Time Aggregation and the Hodrick-Prescott Filter" by Agustín Maravall and Ana del Río (Banco de España).

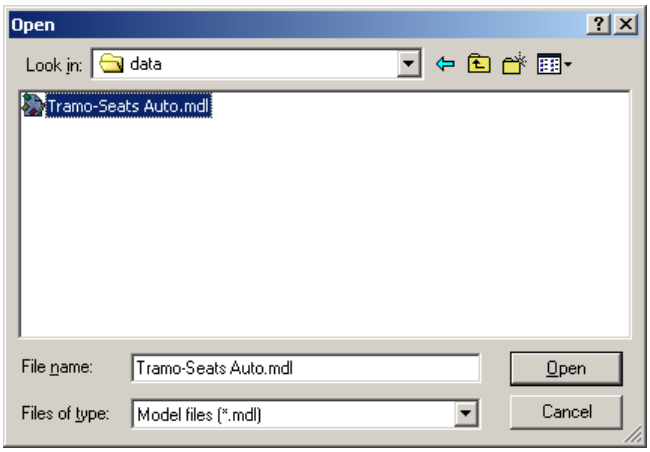
The Business-Cycle series is obtained by sending the Forecasted Stochastic Trend-Cycle series from a first normal Tramo/Seats run (together with the derived ARIMA model) to Seats and recovering the Irregular Component.
The Long-Term Trend is the difference between the Final Trend-Cycle from the first run and the Business-Cycle.
The "Business-Cycle + Irregular" series is the difference between the Final SA series from the first run and the Long-Term Trend.

Remark: Level-shifts are contained in the Long-Term Trend, and thus not in the "Business-Cycle + Irregular" series.

3.2.4. Parameters from a model file for a new modelling

Using this tool, the parameters used for a new processing are loaded from a Demetra model file specified by the user. The user cannot modify here the loaded parameters.

This tool will also ignore all previous modelling settings (except for specific holidays, fixed outliers and user-defined regression variables if wanted so) and readjust all the time series chosen by a unique and complete set of customised modelling parameters for a new seasonal adjustment. The SA parameters and options chosen by the user are applied to all time series in the processed list.



3.2.5. Use of previously defined and saved modelling settings including already estimated ARIMA and regression coefficients

This statistical tool uses all options for the adjustment (pre-adjustment and type of decomposition, ARIMA and regression model, coefficients, etc.) and for the storing of the results that were kept from the previous automatic/customised SA of these series (or that were manually set). With these fixed options, Demetra performs the:

- data transformation,
- mean, trading day, Easter effect and (fixed) outlier corrections,
- automatic re-detection and correction of outliers in the new observations (since the last new automatic/customised adjustment),
- ARIMA forecast at the end of the series,
- application of the Wiener-Kolmogorov filter (SEATS) or the fixed MA filters (X-12-ARIMA).

The ARIMA- and regression coefficients are not re-estimated. Thus, only new observations and new outliers can give rise to revisions.

The tool updates the result time series (e.g. the seasonally adjusted series and the trend series as defined in the previous automatic/customised SA) on the actual end.

Demetra includes functions for storing (new modellings) and reloading (previous parameter sets) the seasonal adjustment settings for each original time series in and from the database.

> *Note: This statistical tool supposes that a set of parameters for each selected time series was previously defined and memorised in the database. Only stored parameters are transmitted to the SA-methods. For all other parameters Demetra uses the default modalities.*

To avoid problems in the automated adjustment procedure related to erroneous adjustment specifications, manually stored sets of parameters should include the parameters that define:

- the data transformations to perform,

- the regression model (and coefficients) to apply,
- a specific ARIMA-model (order and coefficients),
- the period for which the ARIMA- and regression model were estimated,
- the decomposition specification (filters, approximations, bias correction) and
- the list of the result time series to produce by the SA-methods.

For more details, see Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output) on page 107.

3.2.6. Use of previously defined and saved modelling settings but with re-estimation of the ARIMA and regression coefficients

This tool does the same as the above one, except that the previous coefficients of the ARIMA and regression models are re-estimated (but the models are not re-identified!), both for the pre-adjustment and the decomposition, i.e.:

- outliers are re-estimated
- the coefficients of the mean, trading day and Easter effect corrections are revised
- ARIMA forecast at the end of the series using the re-estimated model,
- for SEATS, the filters for the seasonal component and the trend change, but the orders of the ARIMA models are unchanged.

Outliers in the new observations are re-identified and (re-)estimated.

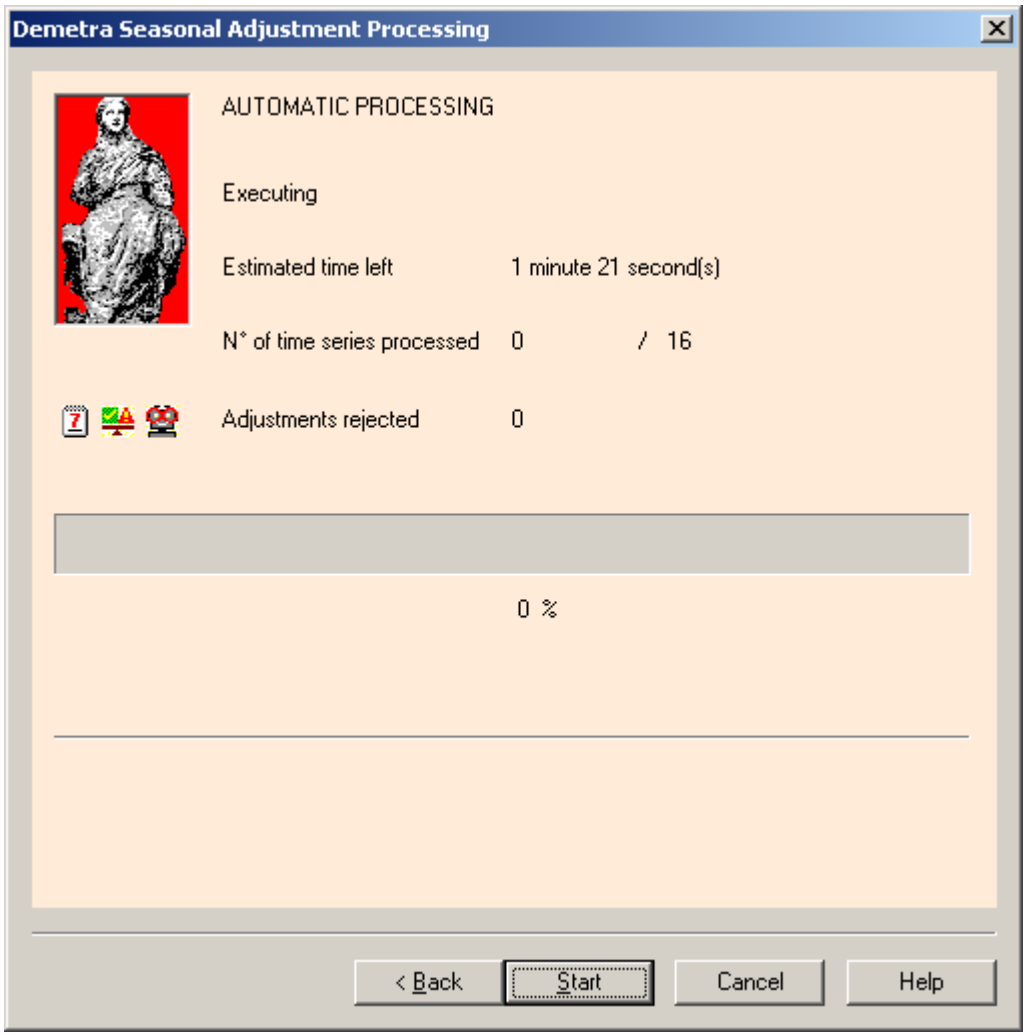
3.2.7. Saving of new parameter sets to the database

The user can decide whether the sets of parameters specific to each time series should be saved to the database using the check box "Save updated adjustment and processing settings for each original time series". By default, the statistical tools using previous parameters do not save parameters. In opposite, the statistical tools for new automatic or customised adjustment saves the new parameters, which would replace previous parameter sets if they already exist.

The sets of the parameters include e.g. the method used to perform the seasonal adjustment (TRAMO/SEATS or X-12-ARIMA), the modelling set (with the corresponding parameters for the SA method), and the types, names and location of the result time series. The names of the result time series are accomplished by their type (e.g. seasonally adjusted series) and their location (e.g. file name).

This saving is necessary if you want to apply the statistical tools using previous parameters in a later run since these tools need the stored parameters.

3.2.8. Automatic processing of SA-methods



Within this dialogue, the user can control the execution of the SA-methods. Errors and warnings are also reported to the log file Demetra.log. The processing of each time series by the SA-methods is not interactive. However, you are permanently informed about the progress in the execution of all series and you can stop, restart or quit the processing at any time (after the SA-method has returned of course from the execution of one series). In rare cases of a hung-up of the SA method, Demetra automatically stops the SA method, issues an error message and continues with the next series.

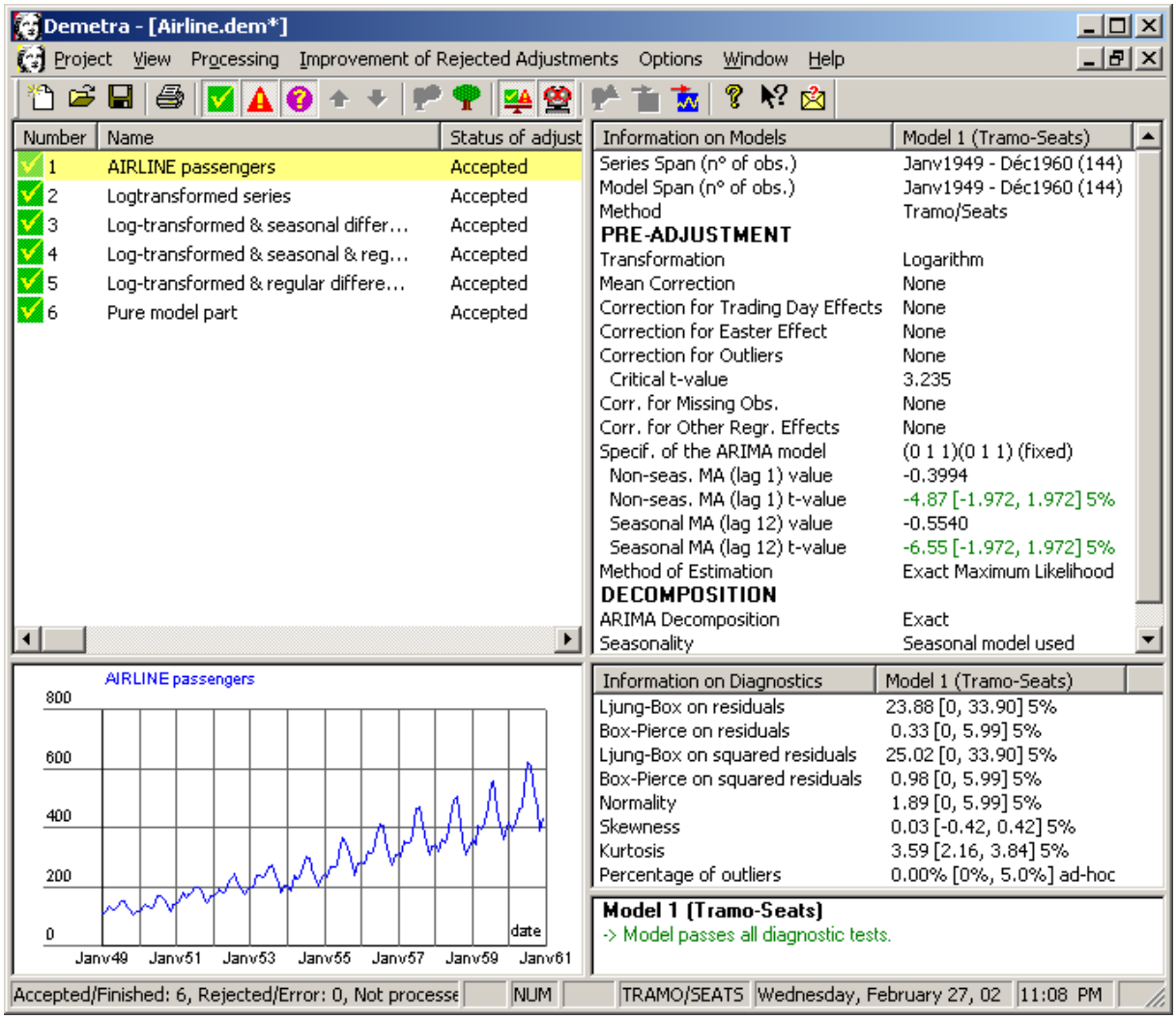
During the processing, the diagnostic statistics of each time series are automatically computed and checked using the decision rules as defined in Criteria for the automatic quality check of time series (see page 27).
In the automated module, an adjustment is automatically added to the list of rejected adjustments, if it turned out to be difficult. It can be treated later in Assisted treatment of rejected adjustments (see page 55).

For rejected adjustments, no result time series or parameters are immediately saved to the database. In opposite, if the diagnostic statistics chosen are not significant then the model for the time series is accepted and the result time series and the corresponding set of parameters are saved directly to the databases or data files.

New icons are shown that indicate the use of the tool for the automatic reduction of trading day regressors, Demetra's stability analysis and Demetra's expert system (for the automatic treatment of rejected adjustments).

3.3. Project main view

After having created or opened a Demetra project within the Automated Module, you will find a frame splitted into 5 sub-windows like the following:



Functions

- New Project: Creates a new project using Demetra's New Project Wizard. First, you will be asked to select the module (Automated or Detailed Analysis) for the new project.

- Open Project: Opens an existing project in a new window. You can open multiple projects at once. Use the Window menu to switch among the multiple open projects.

- Save Project: The complete project is stored in a Demetra project file named by the user that can be re-opened at a later point in time. This option also facilitates the re-using of the project in regular (e.g. monthly) adjustments.

- Close: Closes an open project. Use this command to close all windows containing the active project. Demetra suggests that you save changes to your project before you close it. If you close a project without saving, you lose all changes made since the last time you saved it.
Save Saves an open project using the same file name.
Save As... Saves an open project using a specified file name.
- Exit: Exits Demetra.

- Print Report, Print Preview, Print Setup: Printing of quality reports for several time series

- Copy(/paste) the quality report for a single series as a picture

- Customise project properties (title, author, keywords, comments)

- Access to general Demetra options: working directory, log file settings, auto-recovery settings, language settings, and others

- Customisation of holiday sets

- Customisation of Demetra's Stability Analysis and Expert System 

- Access to project settings: customisation of the rules for the quality check, selections for the type and name of result time series, selection of output databases, selections for the saving of parameter sets

- Access to Seasonal Adjustment Processing Wizard

Redo Adjustment:  This option runs Demetra's Seasonal Adjustment Processing Wizard.

Continue Unfinished Processings:  If you had interrupted the processing of the time series and some series (contained in the table) are still not processed, you can use this option to continue with the next not processed series.

- Access to the tool for the improvement of series with rejected adjustments

Improvement of series with rejected adjustments:  This option invokes the procedure for the assisted treatment of rejected adjustments. If the automatic processing detected series that could not be adjusted with satisfaction (significant/bad diagnostic statistics) then these series are marked as difficult. To enable the option for their treatment you need to have selected at least one difficult series. Do this by mouse-clicking and using the CTRL or SHIFT key. You can select any subset of time series within the list of rejected adjustments.

Treat series with Detailed Analysis Module:  Open a new project with the Detailed Analysis Module and transfer the first of the selected series.

- Window menu: It offers the following commands, which enable you to arrange multiple views or multiple projects in the application window. Attention: the use of multiple projects is not tested yet and should be done with care.

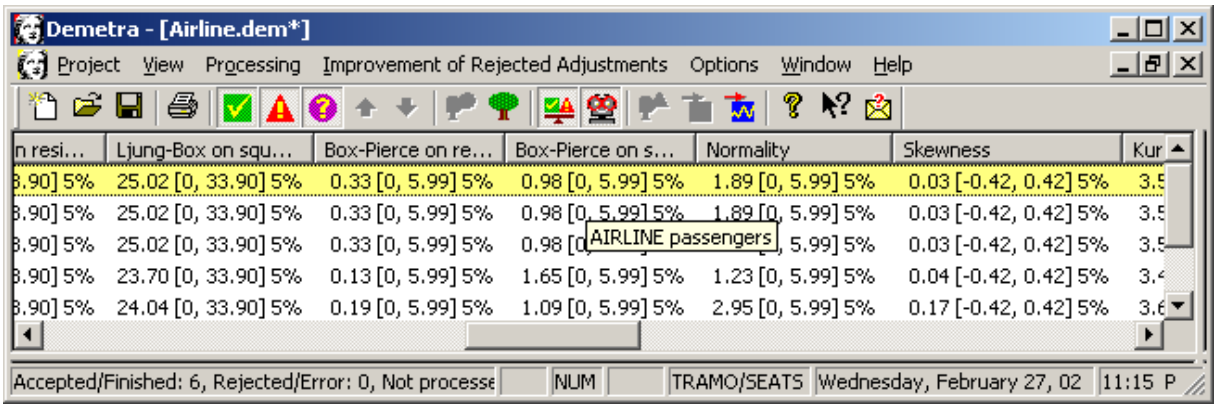
  New Window: Creates a new window that views the same project: Opens a new window with the same contents as the active window. You can open multiple project windows to display different parts or views of a project at the same time. If you change the contents in one window, all other windows containing the same project reflect those changes. When you open a new window, it becomes the active window and is displayed on top of all other open windows. If you close one of these windows, the whole project will be closed.
  Cascade: Arranges multiple opened windows in an overlapped fashion.
  Tile: Arranges multiple opened windows vertically or horizontally in non-overlapped tiles.
  Arrange Icons: Arranges icons for minimised windows at the bottom of the main window. If there is an open project window at the bottom of the main window, then some or all icons may not be visible because they will be underneath this project window.
  Window 1, 2, ...: Goes to specified window. Demetra displays a list of currently open project windows at the bottom of the Window menu. A check mark appears in front of the project name of the active window. Choose a project from this list to make its window active.

- Contents and Index: Offers you an index to topics on which you can get help. Use this command to display the opening screen of the Demetra Help. From the opening screen, you can jump to step-by-step instructions for using Demetra and various types of reference information. Once you open Help, you can click the Contents button whenever you want to return to the opening screen.

- About Demetra: Displays the copyright notice and the version number of your copy of Demetra.

3.3.1. Project status table

The upper left splitter window of the project main view is the project status table. It contains the most important information on the time series (e.g. the names and locations of these time series, the most important modelling specifications, the diagnostic statistics and information on the output saved).



Contents

The following information is given:

At the status bar at the bottom of the Demetra application frame:

- Number of series with accepted/finished adjustments
- Number of series with rejected/erroneous adjustments
- Number of not processed series

See below for the explanation of this type of time series.

> *Note: The time series of the different types are only shown in table if the corresponding check boxes*  *are clicked. If you cannot see any time series in the table verify that the check boxes are clicked.*
>
> *For very-large-scale datasets (projects with more than 1000 time series), only 1000 (configurable within the Demetra options) time series are shown at the time. Use the buttons*  *to select the previous or next block of series.*

In the table (columns):

Name of original time series: as loaded from the database/data file

Status:

- "Not processed (Error message)": The time series has not yet been processed was updated or the programme was not able to perform the adjustment.
- "Data problem": The programme was not able to perform the adjustment. Possible reason can be e.g. the incorrect time series length.
- "Saving failure": The adjustment was successful but the programme could not save the results to the database. Possible reason can be e.g. the temporary loss of the connection to the database.
- "Accepted": The time series has been successfully processed, the diagnostic statistics are not significant or the user accepted the adjustment. The result time series and the corresponding set of parameters are already saved to the databases or data files. No further user action is needed either possible for these time series (except restarting the adjustment after an update of the series).
- "Rejected": The time series has been processed, but the diagnostic statistics are significant. Neither result time series nor the corresponding parameters are saved to the databases or data files. Further user action is needed to find an acceptable model. To start the assisted treatment of rejected adjustments, click on the time series to select them (use the "Ctrl" or "Shift" key to select

several rejected adjustments) and click the corresponding button  .

- "Detailed Analysis Module": A series gets this status if the user had chosen the corresponding option e.g. in the procedure for the assisted treatment of series with rejected adjustments. The series might be better treated in the detailed analysis module to find an acceptable model. The parameters and results can be saved from within the Detailed Analysis Module.
- "Stopped treatment": Series with rejected adjustments can get this status if the user had chosen the corresponding option in the procedure for the assisted treatment of series with rejected adjustments. The user is supposed to treat the series in a different manner outside Demetra: e.g. the series structure may contain an important break that needs the cutting of the series into different parts and their separate adjustment. No further direct user action is possible for these time series (except restarting the adjustment after an update of the series).

Tip: To easily select a large amount of rejected adjustments, unclick all types of time series at the top of the dialog box except the check box for rejected adjustments. Then, only rejected adjustments are shown in the table and one can select them all together using the key combination "Shift" + "End" + "Down".

ARIMA model: short write form for the orders (zeros or positive values) of the computed and applied seasonal ARIMA model "(#AR #I #MA)(#SAR #SI #SMA)", e.g. the Airline model can be written as "(0 1 1)(0 1 1)"

- #AR: order of the regular autoregressive factor
- #I: order of the regular differentiation
- #MA: order of the regular moving average factor
- #SAR: order of the seasonal autoregressive factor
- #SI: order of the seasonal differentiation
- #SMA: order of the seasonal moving average factor

Higher the order more complicate is the model. High model orders may signify non-parsimonious models, lead to highly correlated coefficient estimators, and penalise forecast accuracy. Model orders over (3 2 3)(2 1 2) would be certainly inappropriate. The Airline model (0 1 1)(0 1 1) is a simple, robust and very common model.

Note: If the seasonal part only contains zeros (x x x)(0 0 0), a non-seasonal model is used. If SEATS uses such a model no seasonal factors/component and seasonally adjusted series are computed. In fact, the seasonally adjusted series is equal to the original series.

Diagnostic Statistics:

Ljung-Box on residuals: diagnostic statistic based on the ARIMA residuals in the form "#A [#B, #C] #D", e.g. "26.81 [0, 33.90] 5%"

- #A: statistic
- #B: lower confidence limit
- #C: upper confidence limit
- #D: confidence level in %

A statistic outside the confidence interval (limited by both confidence limits) signifies that there is evidence of autocorrelations in the residuals (of the ARIMA model fitting). A linear structure is left in the residuals.

Ljung-Box on squared residuals: format as the former statistic
A statistic outside the confidence interval signifies that there is evidence of autocorrelations in the squared residuals (of the ARIMA model fitting). A non-linear structure is left in the residuals.

Box-Pierce on residuals: format as the former statistic (only for TRAMO/SEATS)
A statistic outside the confidence interval signifies that there is evidence of autocorrelations in the residuals (of the ARIMA model fitting) at seasonal lags. A linear seasonal structure is left in the residuals.

Box-Pierce on squared residuals: format as the former statistic (only for TRAMO/SEATS)
A statistic outside the confidence interval signifies that there is evidence of autocorrelations in the squared residuals (of the ARIMA model fitting) at seasonal lags. A non-linear seasonal structure is left in the residuals.

Normality: format as the former statistic (only for TRAMO/SEATS)
A statistic outside the confidence interval signifies that the distribution of the residuals (of the ARIMA model fitting) shows asymmetry and/or kurtosis pattern inconsistent with the normal distribution.

Skewness: format as the former statistic (only for TRAMO/SEATS)
A statistic outside the confidence interval signifies that there is evidence of skewness in the residuals (of the ARIMA model fitting). The residuals are asymmetrically distributed (3rd central moment).

Kurtosis: format as the former statistic
A statistic outside the confidence interval signifies that there is evidence of kurtosis (4th central moment) in the residuals (of the ARIMA model fitting).

ARIMA forecast error: format as the former statistic (only for X-12-ARIMA)
A significant size of the ARIMA forecast errors signifies that the forecasts vary too much around the true values. The ARIMA model can not fit the time series well.

Percentage of outliers: format as the former statistic
A high number of outliers signifies either that there is a problem related to a weak stability of the process, or that there is a problem with the reliability of the data. The ARIMA model can not fit all of the observations.

Combined statistic Q: format as the former statistic (only for X-12-ARIMA)
A significant combined statistic Q (M1, M3-M11) means that some of these X-12-Arima quality assessment statistics Mx concerning the decomposition are outside the acceptance region.

Time span (n° of observations):
The period, year of the first and the last observation and the total number of observations are given.

Transformation:
A transformation can be appropriate if the amplitude of the seasonal fluctuations of the series are correlated to the level of the series. This indicates a non-additive relationship between the components of the series that are adequately transformed to obtain an additive structure necessary for the decomposition.

- Logarithm: The logarithm transformation is performed.
- None: No transformation is performed.
- Test for log-transformation: The programme tests for the necessity of a logarithm transformation of the original series (TRAMO: based on a trimmed range-mean regression, complemented with the BIC values, X-12-ARIMA: based on the AICC values). No transformation is performed if a original series contains zeros or negative values.
- Square root transformation: The square root transformation is performed.
- Inverse transformation: The inverse transformation is performed.
- Logistic transformation: The logistic transformation is performed.
- Power transformation: A transformation is performed according to the inputted power value.

Mean correction:
The residuals of the ARIMA model are supposed to follow a normal distribution that includes a mean of zero. Hence, a preceding mean correction may have been done.

- Yes: A mean correction is performed.
- None: A mean correction is not performed.

Trading day effect:
Many economical activities are strongly influenced by calendar effects like varying number of trading days and holidays in each recorded period. In order to improve the seasonal modelling and the trend estimation, such effects should be eliminated before the decomposition.

- No: A trading day correction is not performed.
- 1 regressor: A working day correction is performed: There are no differences in the economical activity between the working days (Monday to Friday) but between these and non-working days (Saturday, Sunday). The varying number of these days is considered.
- 2 regressors: A working day and length-of-period correction are performed: There are no differences in the economical activity between the working days (Monday to Friday) but between these and non-working days (Saturday, Sunday). The varying number of these days and also the

total number of days per period are considered.
- 6 regressors: A trading day correction is performed: There are differences in the economical activity between all days of the week. The varying number of these days is considered.
- 7 regressors: A trading day correction and length-of-period are performed: There are differences in the economical activity between all days of the week. The varying number of these days and also the total number of days per period are considered.
- 6 stock-effect regressors (only for X-12-ARIMA): A stock trading day correction is performed: There are differences in the economical stock activity between all days of the week. The weekday (Monday, Tuesday, ..., or Sunday) of the concerned day of the month (e.g. the last day of the month) is considered.

In general, very short time series are adjusted with few trading day variables (1 or 2), whereas longer time series can be adjusted using 6 or 7 trading day regressors.
Specific holidays (e.g. depending on regions or economical activities like banking) might have been considered if a correction was made.

Easter effect:

Economical activities can be influenced by the varying number of Easter preceding days (with higher economical activities) that fall in either of the months March and April. In order to improve the seasonal modelling and the trend estimation, such an effect should be eliminated before the decomposition.

The number of Easter affected days per year should be adapted to the type of time series if the user possesses more detailed information on the economical background.
- Yes (#A day(s)): The correction for the Easter effects is performed. #A days before Easter are considered in the Easter effect regression variable.
- No: The correction for the Easter effects is not performed.

Outliers:
Outliers are "historically unexpected" values (data irregularities) in the time series that result either from real extraordinary economic effects or from the modelling: some few values may not "follow" the ARIMA model chosen and are therefore excluded from the modelling. Unfortunately, often these real extraordinary economic effects are unknown, and the corresponding time series values are often only detected because they fall out of the structure (modelled with the ARIMA technique) contained in the other values.
- "#A: #B1 #C1(#D1), #B2 #C2(#D2), #B3 #C3(#D3), ...": #A is the number of outliers, the #B's, #C's and #D's are the type, date and observation number of each outlier. #B can have the entries "AO" (additive outlier), "LS" (level shift), "TC" (transitory change or also known as temporary change), "RP" (ramp effect) or "IO" (innovational outlier). An additive outlier is able to catch a single point jump in the data, a temporary change and a ramp effect is a single point jump followed by a smooth return to the original path, and a level shift is a permanent change in the level of the series. Since innovational outlier (especially at the beginning of the series) may have very drastic effects on the level of the series, they should not be considered.
- None: A correction for outliers is not performed or no outliers were found.

Missing observations:
- None: There is no missing observation.
- "#A: #B1 (#C1), #B2 (#C2), #B3 (#C3), ...": #A is the number of missing observations, the #B's and #C's are the date and observation number of each missing observation.

Other regression effects:
The user might have included user-defined (fixed) regression effects like intervention variables into the estimation.
- None: There are no other regression effects.
- "#A Regressor(s)": #A is the number of user-defined (fixed) regression effects (variables).

ARIMA decomposition:
In the case of TRAMO/SEATS, the programme gives more detailed information on the performance of the ARIMA decomposition.
- None: SEATS is not used. No seasonal decomposition is performed.

- Exact: SEATS used the ARIMA model provided by TRAMO for the decomposition. Hence, the models for the pre-adjustment and for the decomposition are the same.
- Seasonal component made zero: SEATS eliminated the seasonal part of the ARIMA model provided by TRAMO because the seasonality is not strong enough for decomposition. Hence, the models for the pre-adjustment and for the decomposition are not the same. The decomposition is limited to the estimation of the trend and of the irregular factors/component. No seasonally adjusted series is computed since it is equal to the original time series. However, the results are normally not impaired by this change.
- Approximated: SEATS changed the ARIMA model provided by TRAMO because e.g. the decomposition of this model was not admissible. Hence, the models for the pre-adjustment and for the decomposition are not the same. However, the results are normally not impaired by this change.
- Not admissible: The SEATS decomposition of the ARIMA model provided by TRAMO was not admissible. The parameter settings forced SEATS not to try to find an adequate model to replace the former one. Hence, no decomposition was done. By default, the series is considered as difficult. To overcome this problem, use the Demetra defaults as parameter settings (it forces Seats to find an adequate replacing ARIMA model). Or, if you use the statistical tool 1 or 2 loading previous modelling settings, manually define a decomposable ARIMA model in the series-specific parameter item in the database (see page 107: Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output)).

X-11 decomposition:
In the case of X-12-ARIMA, the programme gives more detailed information on the performance of the X-11 decomposition.

- With ARIMA forecasts: X-12-Arima could use or successfully select an ARIMA model for the time series and use it to compute forecasts that are added to the time series before the decomposition. This noticeably improves the decomposition quality at the recent end of the series since ("more") symmetric filters are used.
- Without ARIMA forecasts: The automatic ARIMA model selection procedure did not find an acceptable model for the time series in the list. Reasons are the failing of at least one of the tests for an evidence of non-seasonal overdifferencing, for the size of the average absolute percentage error in within-sample forecasts, and for the Ljung -Box Q chi-square probability for each model. This may noticeably harm the decomposition quality at the recent end of the series since asymmetric filters are used.

X-11 seasonal filter:
In the case of X-12-ARIMA, the programme gives more detailed information on the seasonal filter used. The filter might be fixed in advance (by choosing the appropriate option while defining a customised project) or selected by X-12-Arima using the moving seasonality ratio procedure of X-11-ARIMA/88.

- 3x*X* MA: X-12-ARIMA used a 3x*X* moving average (MA, also called seasonal "filter") whereby *X* can be one of the numbers 1, 3, 5, 9 or 15. 3x*X* MA means that an 3-term simple average is taken of a sequence of consecutive *X*-term simple averages. The same MA is applied to all calendar periods (e.g. months or quarters).
  Broadly speaking, long filters (high numbers *X*) are adequate for stable seasonal movements in the time series while short filters (low numbers *X*) are more appropriate for unstable, fast evolving patterns.
- Stable: X-12-ARIMA used a stable seasonal filter: A single seasonal factor for each calendar period (e.g. months or quarters) is generated by calculating the simple average of all values for each period (taken after detrending and outlier adjustment). The stable filter is applied to all calendar periods (e.g. months or quarters).
- X-11 default: A 3x3 moving average is used to calculate the initial seasonal factors in each iteration, and a 3x5 moving average to calculate the final seasonal factors. This seasonal filter is applied to all calendar periods (e.g. months or quarters).
- Depending on period: The user specified in the parameter item that was loaded with the time series, different seasonal filters for different calendar periods (e.g. months or quarters).

X-11 trend filter:
In the case of X-12-ARIMA, the programme gives more detailed information on the trend filter used. The filter might be fixed in advance (by choosing the appropriate option while defining a customised project) or selected by X-12-Arima based on statistical characteristics of the data.

- *X*-term Henderson MA: X-12-ARIMA used a *X*-term Henderson moving average for the detrending whereby *X* can be any odd numbers from 3 to 101.

Broadly speaking, long filters (high numbers *X*) are adequate for stable trend movements in the time series while short filters (low numbers *X*) are more appropriate for unstable, fast evolving patterns.

Seasonality:
This item gives more information on the seasonal structure of the time series or the type of ARIMA model (seasonal/non-seasonal) used for the adjustment. This is an indication if seasonal adjustment is adequate or actually performed.

- Seasonal model used: A seasonal ARIMA model was automatically identified by TRAMO/SEATS. If SEATS was used it did accept the seasonal model and actually perform a seasonal adjustment.
- Non-seasonal model used: A non-seasonal ARIMA model was automatically identified by TRAMO/SEATS, or imposed by SEATS that could not identify significant seasonality in the time series. A seasonal adjustment was NOT performed. If no other adjustments are performed (e.g. calendar adjustment), the seasonally adjusted series would be the same as the original time series, and is therefore not computed and saved to the database.
- Seasonal model imposed: A seasonal ARIMA model was imposed by the user or by the modelling settings saved in the databases. If SEATS was used it did accept the seasonal model and actually perform a seasonal adjustment.
- Non-seasonal model imposed: A non-seasonal ARIMA model was imposed by the user or by the modelling settings saved in the databases. A seasonal adjustment was NOT performed. If no other adjustments are performed (e.g. calendar adjustment), the seasonally adjusted series would be the same as the original time series, and is therefore not computed and saved to the database.
- To be checked: The seasonal adjustment procedure did not yet get to the normal end.
- Significant: X-12-ARIMA identified significant seasonality in the series. A seasonal adjustment is recommended.
- Probably present: X-12-ARIMA identified some uncertain seasonality in the series. A seasonal adjustment is might be recommended.
- Not significant: X-12-ARIMA did not identify significant seasonality in the series. Even though a seasonal adjustment was not recommended or useful, the seasonal adjustment was performed (if so specified). If a pre-adjustment (correction of calendar-effects, outlier correction) is performed, a non-seasonal RegARIMA model should be considered.

Input location:
This indicates the place (computer, directory, database) where the original time series was taken from. The database extension indicates the database type (e.g. db: FAME, xls: MS-EXCEL, txt: ASCII).

Output location:
This indicates the place (computer, directory, database) where the result time series were saved to. The database extension indicates the database type (e.g. db: FAME, xls: MS-EXCEL, txt: ASCII).

Result time series saved:
This indicates the already saved result time series. If this field is empty, no results have been saved yet during the current adjustment. The list contains the type of the results (e.g. fa: final seasonally adjusted time series, ft: final trend series) and the series-specific name of the series as used for the saving. For a complete list of types of result time series and their abbreviations see page 107 for the Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output).

Functions

Use the right-mouse click to access a special context-sensitive menu proposing several very useful functions.

- The contents of the status table can be exported to a text or an Excel file, copied as formatted text or as picture or printed.

Export table: Sometimes, it can be useful to have all the information contained in the table of the Status of the Project in another format or saved to a special database for filing reasons. This option writes the information for all the series contained in the table to a text file named by the user. It is a simple tab-separated ASCII file. It can easily imported e.g. in MS-EXCEL. The information is added to

the file if it is not empty. If the file does not exist it is created.

- Add, remove or update the series.

Note: It is very important to update the time series before performing a new adjustment. After having reopened a project to rerun the processing on a longer series don't forget to tell Demetra to pick up the new values from the database.

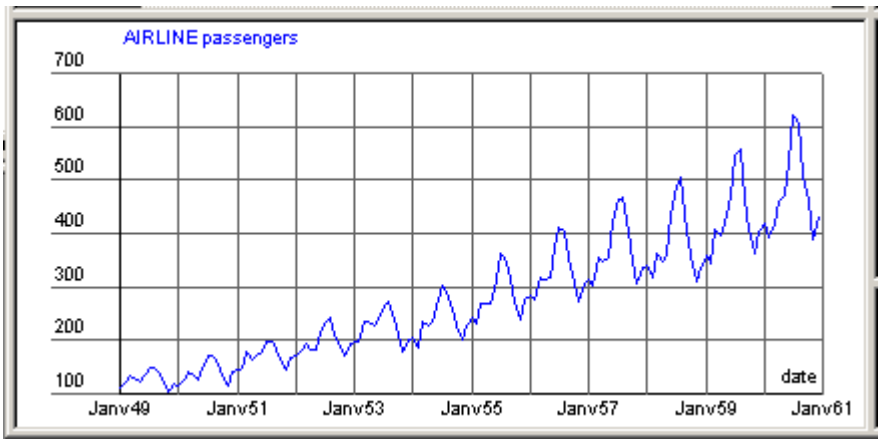
- Restart the processing of all series or a smaller selection.

3.3.2. Graph view

Contents

The window in the lower left corner of the project main view shows the currently selected type of graph. The type of graph to be shown must be selected before the processing; otherwise the corresponding series is not kept in memory.

For very-large-scale datasets (projects with more than 1000 time series), only the original time series can be shown.



Functions

Use the right-mouse click to access a special context-sensitive menu proposing several very useful functions.

- Selection of the series to be graphed (Be sure to select them at least once before the processing).

- Configuration of the axis scaling (zoom)

- Configuration of the graph styles (line pattern)

- Adding/removing a legend (relationships between series names and line pattern used)

- Export of graphed values into text file

- Printing of the graph

- Copy the graph as a picture (copy/paste into other working documents)

3.3.3. Table “Information on Models”

Contents

The window in the upper right corner of the project main view shows the most important modelling information for the currently selected time series in the status table. In the tool for the improvement of rejected adjustments, several parameter sets (“models”) can be contained in the table.

Information on Models	Model 1 (Tramo-Seats)
Series Span (n° of obs.)	Janv1949 - Déc1960 (144)
Model Span (n° of obs.)	Janv1949 - Déc1960 (144)
Method	Tramo/Seats
PRE-ADJUSTMENT	
Transformation	Logarithm
Mean Correction	None
Correction for Trading Day Effects	None
Correction for Easter Effect	None
Correction for Outliers	None
Critical t-value	3.235
Corr. for Missing Obs.	None
Corr. for Other Regr. Effects	None
Specif. of the ARIMA model	(0 1 1)(0 1 1) (fixed)
Non-seas. MA (lag 1) value	-0.3994
Non-seas. MA (lag 1) t-value	-4.87 [-1.972, 1.972] 5%
Seasonal MA (lag 12) value	-0.5540
Seasonal MA (lag 12) t-value	-6.55 [-1.972, 1.972] 5%
Method of Estimation	Exact Maximum Likelihood
DECOMPOSITION	
ARIMA Decomposition	Exact
Seasonality	Seasonal model used

Functions

Use the right-mouse click to access a special context-sensitive menu proposing several very useful functions.

- Customisation of the model name.

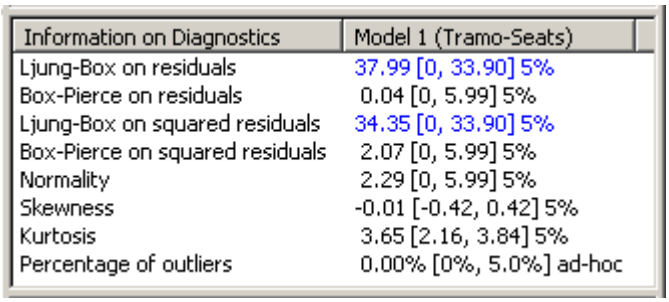
- Visualisation of a selected parameter set with the original parameter formats of the interface seasonal adjustment methods (in a text file)

- The contents of the table can be exported to a text or an Excel file, copied as formatted text or as picture or printed.

3.3.4. Table “Information on Diagnostics”

Contents

The window in the middle right area of the project main view shows the most important information on diagnostic statistics for the currently selected time series in the status table. In the tool for the improvement of rejected adjustments, several parameter sets (“models”) can be contained in the table.



Information on Diagnostics	Model 1 (Tramo-Seats)
Ljung-Box on residuals	37.99 [0, 33.90] 5%
Box-Pierce on residuals	0.04 [0, 5.99] 5%
Ljung-Box on squared residuals	34.35 [0, 33.90] 5%
Box-Pierce on squared residuals	2.07 [0, 5.99] 5%
Normality	2.29 [0, 5.99] 5%
Skewness	-0.01 [-0.42, 0.42] 5%
Kurtosis	3.65 [2.16, 3.84] 5%
Percentage of outliers	0.00% [0%, 5.0%] ad-hoc

Functions

Use the right-mouse click to access a special context-sensitive menu proposing several very useful functions.

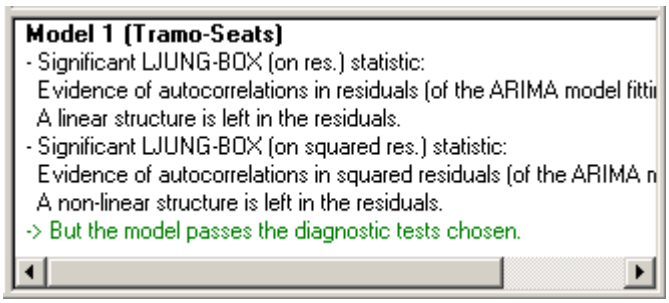
- Customisation of the model name.

- The contents of the table can be exported to a text or an Excel file, copied as formatted text or as picture or printed.

3.3.5. Comments

Contents

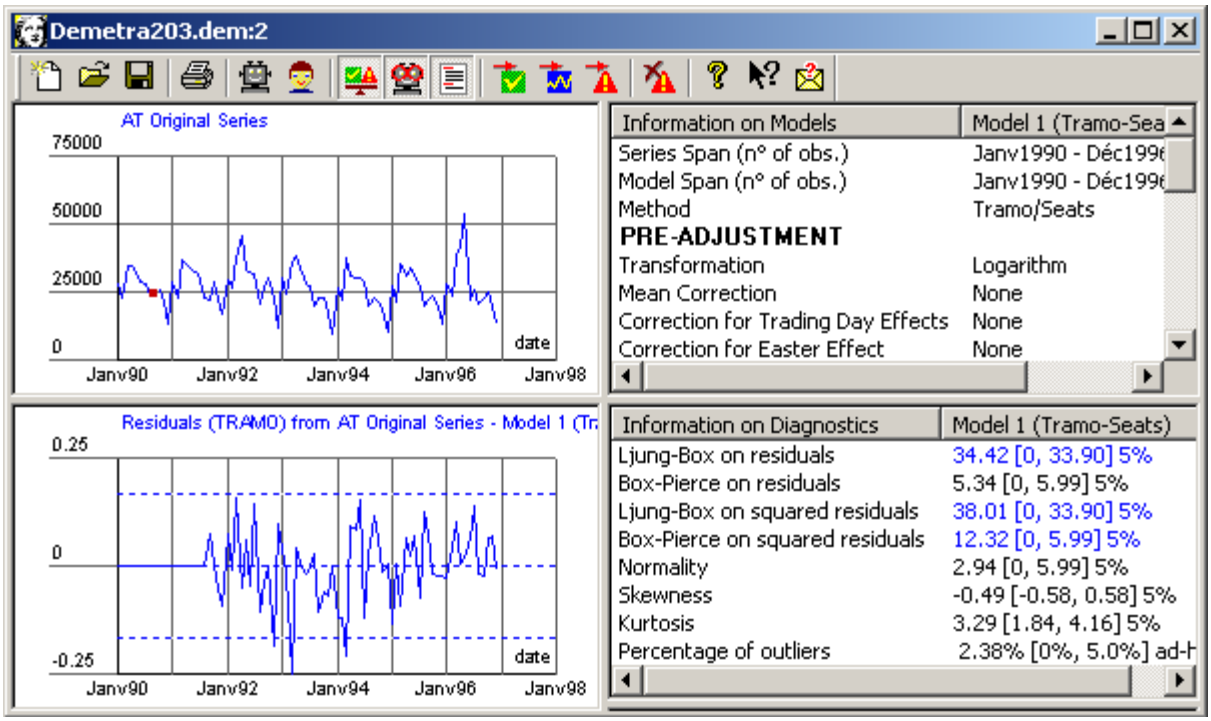
The window in the lower right corner of the project main view shows the information on diagnostic statistics in text form for the currently selected time series in the status table. An explanation is given for all significant statistics as well as an overall conclusion for the acceptance of the adjustment. In the tool for the improvement of rejected adjustments, several parameter sets (“models”) can be contained in the table.



3.4. Improvement of rejected adjustments

The adjustments are always checked for their quality. For the once that do not meet the predefined conditions on quality, an improvement of the modelling is necessary. That can be done by selecting a set of such series and invoking the special tool for the improvement of rejected adjustments.

In this tool, the processing of all the selected series is performed one by one. During all steps of analysis, Demetra assists the user to find out the difficulties in a series and the way to treat the series in an adequate manner. In fact, up to two new modelling sets are being created that should perform an adjustment with satisfying diagnostic statistics.



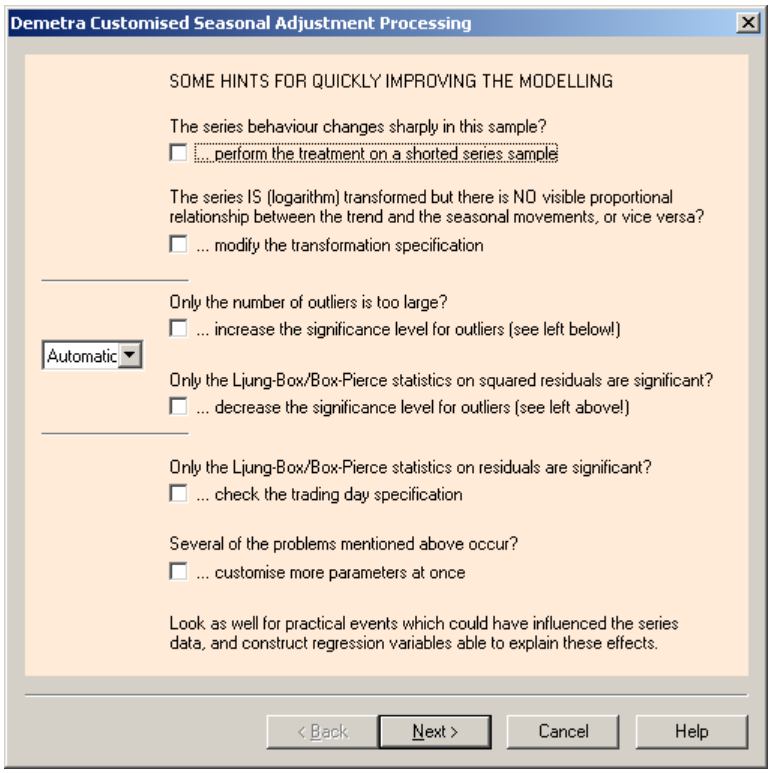
The screen shows similar windows to the once of the Automated Module main project view.

Functions

The interface works in the following way: Using the menu functions you can create new parameter sets to perform new automatic modelling or new customised modelling.

- The "new automatic modelling" option results in running the same seasonal adjustment method (TRAMO/SEATS or X-12-ARIMA) as used in modelling set 1. However, it uses the most automatic options (with test for trading day and length-of-month adjustment and automatic reduction of the number of trading day regressors) that are independent of any other previously set parameters.

- If you choose the "new customised modelling" option, Demetra recommends taking one of following actions:



If one takes any of the actions listed above, then Demetra re-runs the seasonal adjustment method (TRAMO/SEATS or X-12-ARIMA) as used in modelling set 1. It uses the automatic processing options plus the modified parameters for trading day correction, logarithm transformation, the critical value for outliers or others.

The model obtained from the new adjustment is has a different name. The new result series graphs, specification and diagnostic results of the new adjustment are displayed. The automatic processing option can be used only once for a series.

If a new model for a series passes the diagnostic tests, then the user can accept this model and the interface saves the output (result time series) and the corresponding new set of parameters directly into the databases or data files. The series is removed from the list of rejected adjustments.

The other options are:

“Treat series with Detailed Analysis Module”: If selected so in a confirmation dialogue, stop the treatment of the active series with a rejected adjustment. This series will not be treated anymore within this project using the large-scale module. This series is better treated using the Detailed Analysis Module.

Skip Series: Stop the treatment for the active series with a rejected adjustment. Continue with the next series or close this view if all selected series are treated. The skipped series can be treated later again.

“Stop Treatment of Rejected Adjustments”: Stop the treatment of the active and all the remaining series with an rejected adjustment. Go back to the project main view. All the skipped series can be treated later again.

3.4.1. Meaning of significant diagnostic statistics

Diagnostic statistic	*Kind of problem in time series*
Ljung-Box test on residuals	*Evidence of autocorrelations in residuals (of the ARIMA model fitting). A linear structure is left in the residuals.*
Box-Pierce test on auto-correlations of residuals at seasonal lags	*Evidence of autocorrelations in residuals (of the ARIMA model fitting) at seasonal lags. A linear seasonal structure is left in the residuals.*
Ljung-Box test on squared residuals	*Evidence of autocorrelations in squared residuals (of the ARIMA model fitting). A non-linear structure is left in the residuals.*
Box-Pierce test on auto-correlations of squared residuals at seasonal lags	*Evidence of autocorrelations in squared residuals (of the ARIMA model fitting) at seasonal lags. A non-linear seasonal structure is left in the residuals.*
Normality test on residuals	*The distribution of residuals (of the ARIMA model fitting) shows asymmetry and/or kurtosis pattern inconsistent with the normal distribution.*
Skewness	*Evidence of skewness in residuals (of the ARIMA model fitting). The residuals are asymmetrically distributed (3rd central moment).*
Kurtosis	*Evidence of kurtosis (4th central moment) in residuals (of the ARIMA model fitting).*
Size of errors in out-of-sample forecasts	*The out-of-sample forecasts vary too much around the true values. The chosen ARIMA model cannot fit the time series well. Since the forecasts will be used for the decomposition of the time series, a satisfactory accuracy cannot be assured on the actual end of the components.*
Number of outliers	*High number of outliers found. Either there is a problem related to a weak stability of the process, or there is a problem with the reliability of the data. The chosen ARIMA model cannot fit all of the observations.*
Number of outliers on a particular period	*Evidence of an anomaly on a particular period. An index variable should be built to catch it*
All candidate ARIMA models rejected	*No model with acceptable forecast errors, Ljung-Box Q statistic and no sign of overdifferencing could be found. The decomposition is done without ARIMA forecasts.*
Significant combined statistic Q (M1, M3-M11	*Some of the X-12-Arima quality assessment statistics M concerning the decomposition are outside the acceptance region.*

Chapter 4 :

Description of the

Detailed Analysis Module

4.1. General overview

The module for detailed analysis allows in-deep examinations of the seasonal behaviour of single time series and is a useful tool for analysing time series with behaviour very difficult to model. User-friendly graphs and tables assist the user in the examination process. The user can take advantage of nearly the whole capacity of the SA-methods: Demetra provides access to most of the options of X-12-ARIMA and TRAMO/SEATS.

The user has full access to all output of the SA-methods TRAMO/SEATS and X-12-ARIMA including text output, data output (time series), diagnostics and graphs. The modelling specifications and diagnostic statistics from the SA-methods TRAMO, SEATS and X-12-ARIMA can be viewed with 3 degrees of detail (brief list, most important specifications, and complete list).

Different parameter sets can in very few clicks be created, deleted, copied or pasted, reset to automatic options, translated from Tramo/Seats to X-12-Arima and vice-versa and compared between each other.

The interface provides the possibility for saving the result time series and the corresponding set of the parameters into the production databases, data files or text files, and to export modelling specifications and diagnostic statistics into a text or Excel files.

Before you can start the analysis, you need to create and configure the project. Do that with Demetra's Project Wizard.

4.2. Demetra Project Wizard

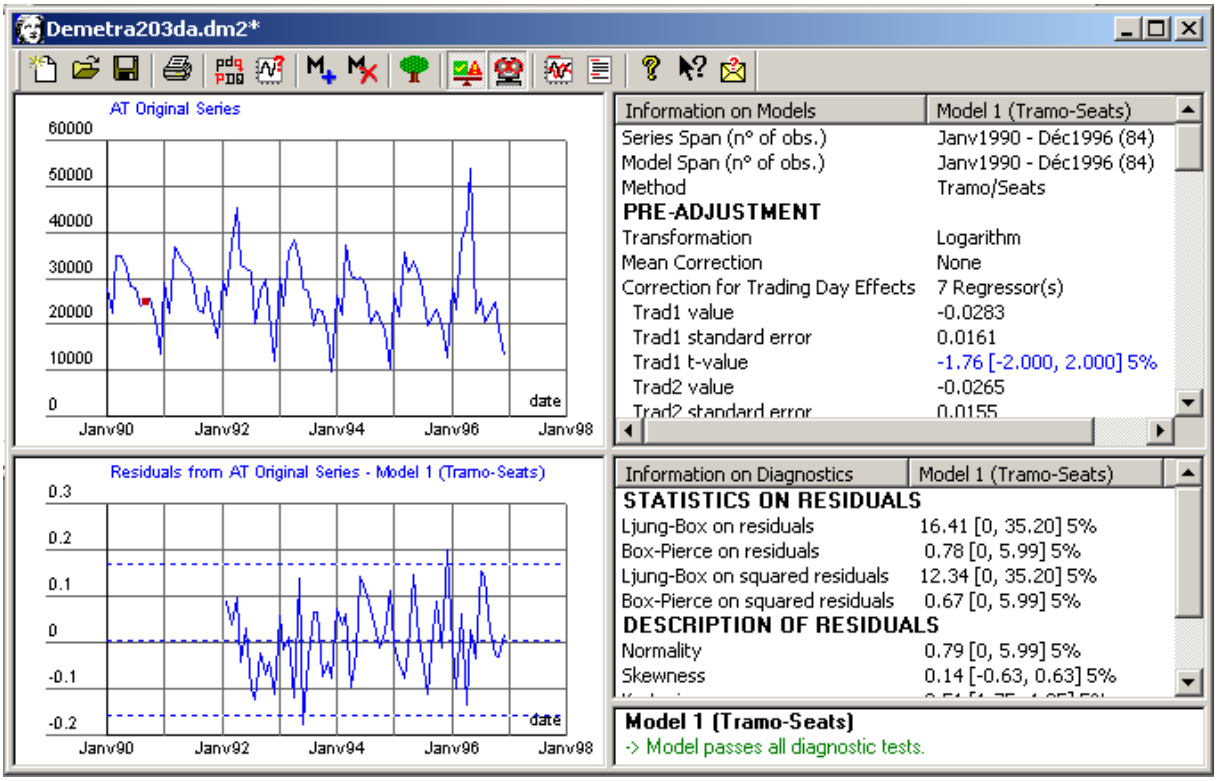
Please see the instructions in the equivalent chapter of the Automated Module.

Attention: Several time series can be loaded into a Detailed Analysis project, but only one single time series can be treated at the time.

Remark: If Demetra finds during the time series loading process a previously stored parameter set in the database, it creates a new "model" in the project and shows the modelling specifications. If no parameter set was found, a dialog will ask you for the creation of a new one.
A model is always associated to one fixed seasonal adjustment method: either TRAMO/SEATS or X-12-ARIMA.

4.3. Project main view

After having created or opened a Demetra project within the Detailed Analysis Module, you will find a frame splitted into 5 sub-windows like the following:



- Left areas: Graph of the original time series and graph of residuals or other result time series produced by the seasonal adjustment methods (if available)
- Upper right area: Table of modelling specifications for each modelling set (modelling specifications/statistical treatment)
- Middle right area: Table of diagnostics for each modelling set
- Lower right area: Text message referring to significant diagnostic statistics for each modelling set with conclusion

Note: To see relevant data in these windows (except the graph of the original time series), you need to create at least one model.

Functions

The module for detailed analysis is build with the aim to allow in-depth comparisons of different variants (sets) of seasonal adjustment parameters and adjustment methods for single series of particular interest. Demetra provides tools to:

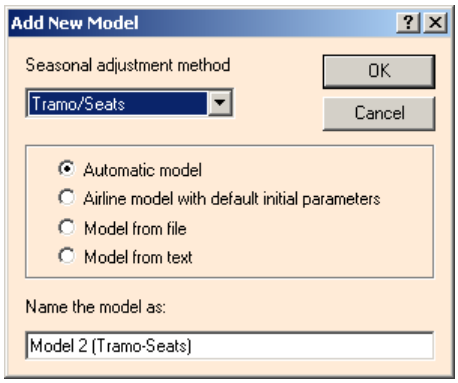
- add/delete/save/cut/copy/paste "models" (sets of modelling/seasonal adjustment parameters):

These "models" can contain different modalities for the parameters of one SA-method or they can contain comparable settings for different adjustment methods (TRAMO/SEATS, X-12-ARIMA). The specifications of each model are shown in the lower left table called "Information on Models".

Pulldown menus: Specifications – Add New Model...
Specifications – Delete Model...
Specifications – Define User Model...

You can add a model
- with parameters for a fully automatic seasonal adjustment (3rd statistical tool: "Default parameters for a new automatic processing"): "Automatic model"
- with the simple and robust AIRLINE specification with default initial coefficients (original TRAMO/SEATS or X-12-ARIMA defaults): "Airline model with default initial parameters"
- or with user defined parameters (that must have been previously saved in a model file). In the first two options, you need to specify the seasonal adjustment method to be used: "Model from File"

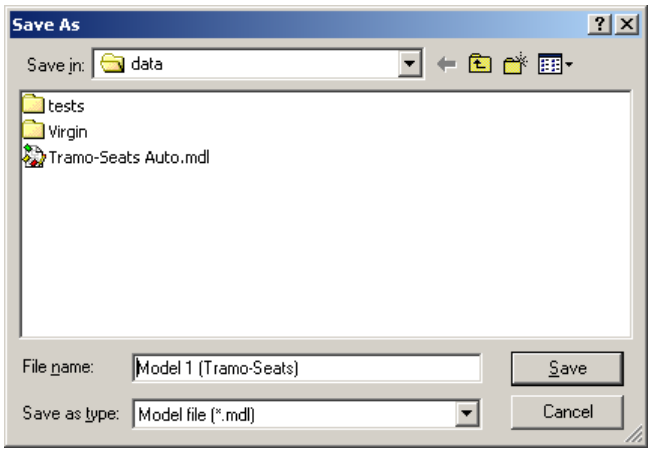
Demetra now provides the possibility to give the new model a customised name. It will be used wherever the model is mentioned.



Tip: You can also change the name of a model later if you click in the columns of the modelling sets in the tables for "Information on Models" or "Information on Diagnostics".

You can delete any previously added models from the workspace. All results and outputs of these models will be destroyed.

Save your models that can be useful for other time series or later adjustments to a special model file. For that use the function "Define User Model". Models stored in this way can be re-loaded in the "Add New Model" dialog box using the option "Model from file". Parameters depending on time series characteristics (e.g. time series length) are ignored.



- modify single models:

Pulldown menus: Specifications – Modelling...
Specifications – Statistical Treatment...

Demetra allows modifications of the specifications of the "Modelling..." and "Statistical Treatment..." of one of the models already created. Select the model for which you want to change some parameters and customise the settings for the

- "Data Handling" (transformations, interpolations, mean correction),
- "Regression Variables" (trading day and Easter effect, outliers),
-·"ARIMA Model Specification" or "Automatic Model Identification/Selection" and
- "Model Estimation"

- or "Decomposition" (ARIMA-model based method or MA-based procedure "X11") and
- "Forecasting"
- “Revision History Analysis” (only for X-12-Arima)
- “Sliding Spans Analysis” (only for X-12-Arima).

For more information on this topic, see pages 72 to 87.

Remark: The changes to the parameters will only be applied, if you quit the dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel". You will only be able to perform parameter modifications after having created at least one "model". See the paragraph just above for more about how to create a new model.

- modify application settings:

Pulldown menus: Options – Result Series (for Databases)...
Options – Rules for Quality Check...

Demetra allows the a-priori selection of the result time series that should be produced by the seasonal adjustment methods, and that should be saved to the result databases when the adjustment is finally accepted. Make your choice before you run the seasonal adjustment methods!

Attention: The selection of a result time series does not mean that this series will necessarily be created: The SA-methods Tramo/Seats and X-12-Arima only produce the results that correspond to the regression and ARIMA model used (factors or components that represent the effects/terms included in the model). Only these results can be obtained. Missing results are therefore not an error of Demetra.

See the Project Wizard for more information.

Use the pull down menu item "Rules for Quality Check..." to select the diagnostic statistics that Demetra should use to control the quality of adjustment like significance levels, the number of outliers which will be accepted, etc.

For more information, see page 27 for the Criteria for the automatic quality check.

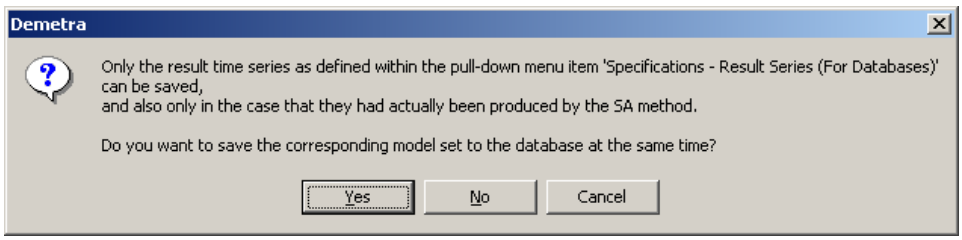
- process the time series:

Pulldown menus: Processing – Execute SA...
Processing – Save Results to Database – Result Series
Processing – Save Results to Database – Parameter Set
Processing – Export Status Information

Run the seasonal adjustment methods (TRAMO/SEATS) on the loaded time series using one of the models in the project. You can run the methods several times on the same model even if you don't change any parameters. TRAMO/SEATS and X-12-ARIMA can return new modalities of parameters and therefore change the model, e.g. the option for a pre-test of log-transformation will result in a decision: a model with or without log-transformation.
After the seasonal adjustment, you can save the results time series (e.g. trend or seasonally adjusted series) for a given model to the database, you can save the parameters of a model to the original time series (The saved parameters can be used again in the automated module in statistical tool 1 or 2 using "Previous model settings"), and you can export the information on the time series like model specifications and diagnostic statistics to a text file (Use this function to create or update summary tables (for filing)- the format used is very convenient for an import in MS-Excel (tab-separated format). This function corresponds to the export of text information in the dialog box "Status of the Project" in the automated module.

> *Remark: In some cases, the treatment with the SA-methods can be very long, especially if you have a relatively rejected adjustments and options for new estimations. Please be patient and wait for the return of the programme. Demetra will normally tell you if any error occurred.*

Demetra only saves the result time series that have been selected previously to the execution of the seasonal adjustment method, and that have actually been calculated by them. Make this choice at the beginning of your work before you run the seasonal adjustment methods because subsequent selections have no influence anymore!



Before saving the result time series, Demetra will request for the place of saving (name and location of result ASCII file, EXCEL file or FAME database).

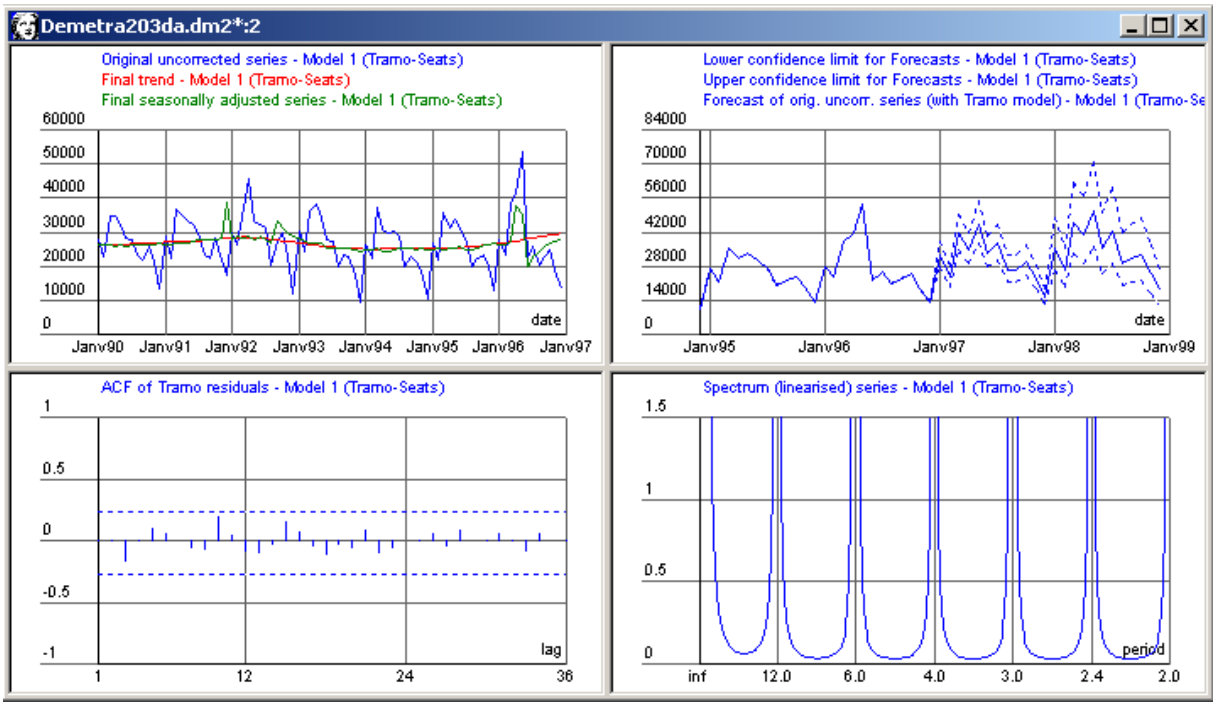
- compare the results (graphs and diagnostics) for different models:

Pulldown menus: Result Analysis – Information on Models
Result Analysis – Information on Diagnostics
Result Analysis – Graphical Comparison Tool
Result Analysis – Show Log File...

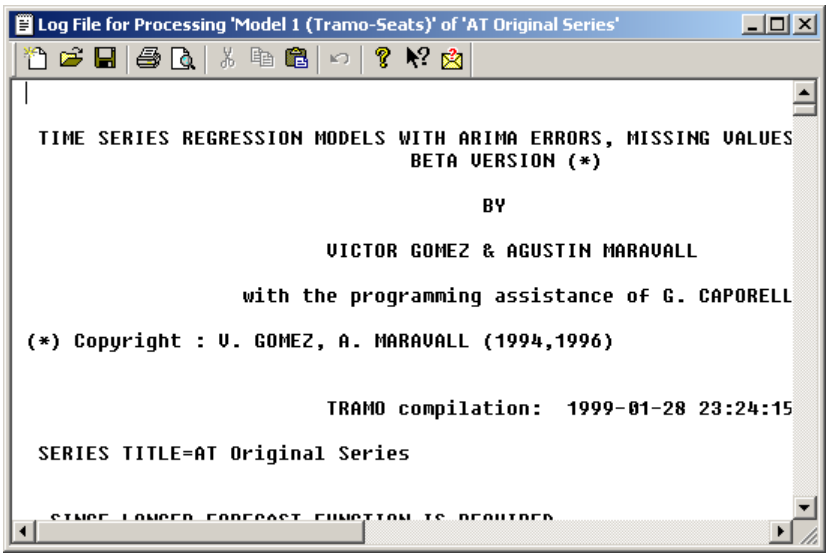
Following modifications can be done to the detailed analysis project view:
- You can customise the degree of detail in the table of "Information on Models" and the table of "Information on Diagnostics": brief list, most important specifications and complete list.

- An important tool in the detailed analysis module is the view for the graphical comparison of result time series. It is invoked by the menu item "Graphical Comparison Tool..." and opens a new window with 4 non-overlapping areas for different graphs. Double-click on the graph areas to add or remove result time series to or from the charts. Right-click on the graph areas to change the graph

scaling, to get a tip for printing graphs and to export the graphed data to a text file that is immediately opened.



- It is possible to view the log files (also called output files) of the SA methods TRAMO/SEATS and X-12-ARIMA for a specific model using the notepad or wordpad viewer. For this use the menu item "Show Log File...". Only currently available log files can be viewed.



Use the different pulldown menus in "Window" and "Help" to manipulate the different windows and project views, to run the Demetra Help or to call the "About Demetra..." dialog box as usual just as in other standard MS Windows software.

Tips:

- *Clicking on the different model names in the column titles of the tables for "Information on Models" or "Informations on Diagnostics" changes the model of the result series (e.g. residuals) shown in the upper right area.*
- *Clicking inside the different columns of the tables for "Information on Models" or "Informations on Diagnostics" invokes a dialog box that let you customise the name of the corresponding modelling set.*

- *Moving the mouse cursor over the graph data invokes a small tip window that gives information on the currently hit series data (name of the series, name of the model, series value, date).*
- *Right-clicking on the graph areas allows you to change the graph scaling, to get a tip for printing graphs and to export the graphed data to a text file that is immediately opened. Exported data can easily be copied into MS-EXCEL: use the CTRL + INSERT keys to copy the selected data to the clipboard, use the SHIFT + INSERT keys to paste the data into the already opened EXCEL sheet.*

4.3.1. More details on the table "Information on Models"

The upper right area of the Detailed Analysis project view contains the table with information on each model concerning the parameters for the modelling specifications and the statistical treatment.

Information on Models	Model 1 (Tramo-Seats)
Series Span (n° of obs.)	Janv1990 - Déc1996 (84)
Model Span (n° of obs.)	Janv1990 - Déc1996 (84)
Method	Tramo/Seats
PRE-ADJUSTMENT	
Transformation	Logarithm
Mean Correction	None
Correction for Trading Day Effects	7 Regressor(s)
Trad1 t-value	-1.76 [-2.000, 2.000] 5%
Trad2 t-value	-1.72 [-2.000, 2.000] 5%
Trad3 t-value	1.34 [-2.000, 2.000] 5%
Trad4 t-value	1.88 [-2.000, 2.000] 5%
Trad5 t-value	-0.71 [-2.000, 2.000] 5%
Trad6 t-value	-0.65 [-2.000, 2.000] 5%
Trad7 t-value	1.61 (derived) [-2.000, 2.00...
Leap-year t-value	1.19 [-2.000, 2.000] 5%
Correction for Easter Effect	None
Correction for Outliers	Autom.:AO,LS,TC; 4 Outlier(...
Critical t-value	3.200
TC Juin1996 t-value	-6.24 [-3.200, 3.200] crit.val.
AO Déc1991 t-value	5.65 [-3.200, 3.200] crit.val.
TC Avr1996 t-value	4.42 [-3.200, 3.200] crit.val.
TC Sept1992 t-value	3.93 [-3.200, 3.200] crit.val.
Corr. for Missing Obs.	1 Miss.obs.
Sept1990 (9) interp. value (l...	22041.5010
Corr. for Other Regr. Effects	None
Specif. of the ARIMA model	(0 1 1)(0 1 0) (fixed)
Non-seas. MA (lag 1) value	-0.7411
Non-seas. MA (lag 1) t-value	-9.30 [-2.000, 2.000] 5%
Method of Estimation	Exact Maximum Likelihood
DECOMPOSITION	
ARIMA Decomposition	Exact
Seasonality	Seasonal model used

These parameters can be set or modified in the following ways:

- reading the model from the database: Demetra automatically finds models sets of previously treated time series
- adding a model to the project: Demetra sets the parameters to the default, automatic or previousy saved modalities for the new model.
- pasting a copied a model from any project: Demetra copies exactly the parameter settings from the copied model.
- changing of parameters by the user: using the dialogs for changing the specifications for the modelling and statistical treatment of one model.
- changing of parameters by Tramo/Seats and X-12-Arima: the SA methods can return new modalities of parameters and therefor change the executed model, e.g. the option for a pre-test of log-transformation will result in a decision: a model with or without log-transformation.

Using the menu, you can customise the degree of detail in this table to: **brief list**, most important specifications and complete list.

Information	Categorical value: all possible options Numerical values and dates: Example
Time Span (n° of obs.)	**01/1980 - 12/1994 (180)**
PRE-ADJUSTMENT	
Transformation	***Logarithm*** ***Power*** ***Non***
Mean Correction	***Yes*** ***None***
Mean value	0.00065873
Mean standard error	0.0015
Mean t-value	0.44 [-1.990, 1.990] 5%
Correction for Trading Day Effect	***# Regressor(s)*** ***None***
Trad1 value	-0.0066
Trad1 standard error	0.00451
Trad1 t-value	-1.46 [-1.990, 1.990] 5%
...	...
Correction for Easter Effect	***Yes (# day(s))*** ***None***
Easter effect value	-0.0493
Easter effect standard error	0.02551
Easter effect t-value	-1.93 [-1.990, 1.990] 5%
Correction for Outliers	***# Outlier(s)*** ***None***
LS May 1980 (5) value	-0.11704
LS May 1980 (5) standard error	0.03374
LS May 1980 (5) t-value	**-3.47 [-1.990, 1.990] 5%**
…	
Correction for Missing Observations	***# Miss.obs.*** ***None***
Jan 1987 (85) interp.value (level)	**13681**
Jan 1987 (85) SE of interp.value	123
Jan 1987 (85) value	11.1995
Jan 1987 (85) standard error	0.06086
Jan 1987 (85) t-value	184.03 [-1.990, 1.990] 5%
…	
Correction for Other Regression Effects	***# Regressor(s)*** ***None***
User1 value	0.0432
User1 standard error	0.01509
User1 t-value	2.86 [-1.990, 1.990] 5%
…	
Specification of the ARIMA-Model	***New identification*** ***New selection*** ***(2 1 0)(0 1 1) (new estimation)*** ***(2 1 0)(0 1 1) (fixed)***
Non-seas. AR (lag 1) value	-0.7156
Non-seas. AR (lag 1) standard error	0.06931
Non-seas. AR (lag 1) t-value	-10.32 [-1.990, 1.990] 5%
…	…
ARIMA Method of Estimation	*Exact Maximum Likelihood* *Unconditional Least Squares* *Conditional Least Squares*
DECOMPOSITION	
X-11 Decomposition	***Try with ARIMA forecasts*** ***With ARIMA forecasts*** ***Without ARIMA forecasts*** ***With/without ARIMA forecasts?***
X-11 Seasonal Filter	***Depending on period*** ***3x1 MA***

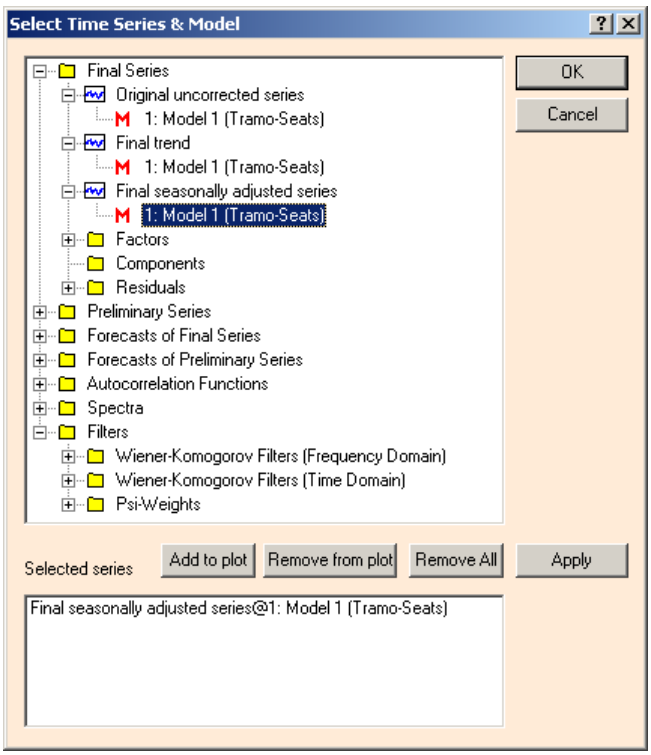
	3x3 MA ***3x5 MA*** ***3x9 MA*** ***3x15 MA*** ***Stable*** ***Automatic*** ***X-11 default***
Seas. filter Q1 … Seas. filter Jan …	idem … idem …
X-11 Trend Filter	**Automatic** **#-term Henderson MA**
ARIMA Decomposition	**None** **Yes** **Exact** **Seas. comp. made zero** **Approximated** **Not admissible**
Seasonality	**To be tested** **Significant** **Not significant** **Probably present** **Seasonal model imposed** **Non-seasonal model imposed**

4.4. Graphical Comparison Tool

4.4.1. Selection of (result) series

The time series tree shown in this dialog box contains all the available result time series that have already been produced within the current Detailed Analysis project. It is structured in the following way:

1. level: general type of result time series
2. level: name of result time series
3. level: name of the modelling set to which the result time series belongs to



To add a series to the graph shown in the corresponding area of the Graphical Comparison Tool, you must precise your selection up to the level 3! Otherwise an error message "You need to select a model." will be shown. Than click on the "Add to plot" button.

> *Remark: Demetra will take care about the compatibility of the time series chosen since only time series of the same type can be shown in one single plot. If you select series that can not be plotted in the same graph, an error message "Incompatible graph types for overlay" is shown.*

To remove a series from the graph shown in the corresponding area of the Graphical Comparison Tool, select the series in the lower listbox. Than click on the "Remove from plot" button.

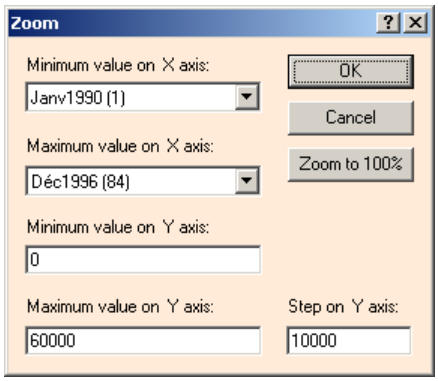
To completely clean the corresponding graph area of the Graphical Comparison Tool, click on the "Remove all" button.

Finally accept your choice with the "OK" button.

You can cancel the function with the Cancel button.

4.4.2. Zooming of graphs/customised scaling

Use this dialog box to zoom the graph shown in the corresponding area of the Graphical Comparison Tool.



You can customise:

- the minimum and maximum value of the x-axis. The number of tick-mark labels on the x-axis is automatically calculated depending on the horizontal graph size. To increase the number of tick-mark labels enlarge the graph horizontally using the mouse cursor. For usual time series with date scaling, the tick-mark scaling (vertical grid) corresponds to the calendar years: All January values have a vertical grid line. A minimum of 2 periods between the minimum value and maximum value of the x-axis must be respected.
- the minimum, maximum and step width value of the y-axis. Of course, the minimum value must be smaller than the maximum value. The step width should be chosen depending on the minimum and maximum. It is automatically recalculated if it was entered too small (too many "overlapping" tick-mark labels would have to be included) or too large (no tick-mark labels could be included). The axis scaling is automatically recalculated if the step width was not a multiple of the difference between the minimum and maximum value. To further reduce the step width value (or increase the number of tick-mark labels) enlarge the graph vertically using the mouse cursor.

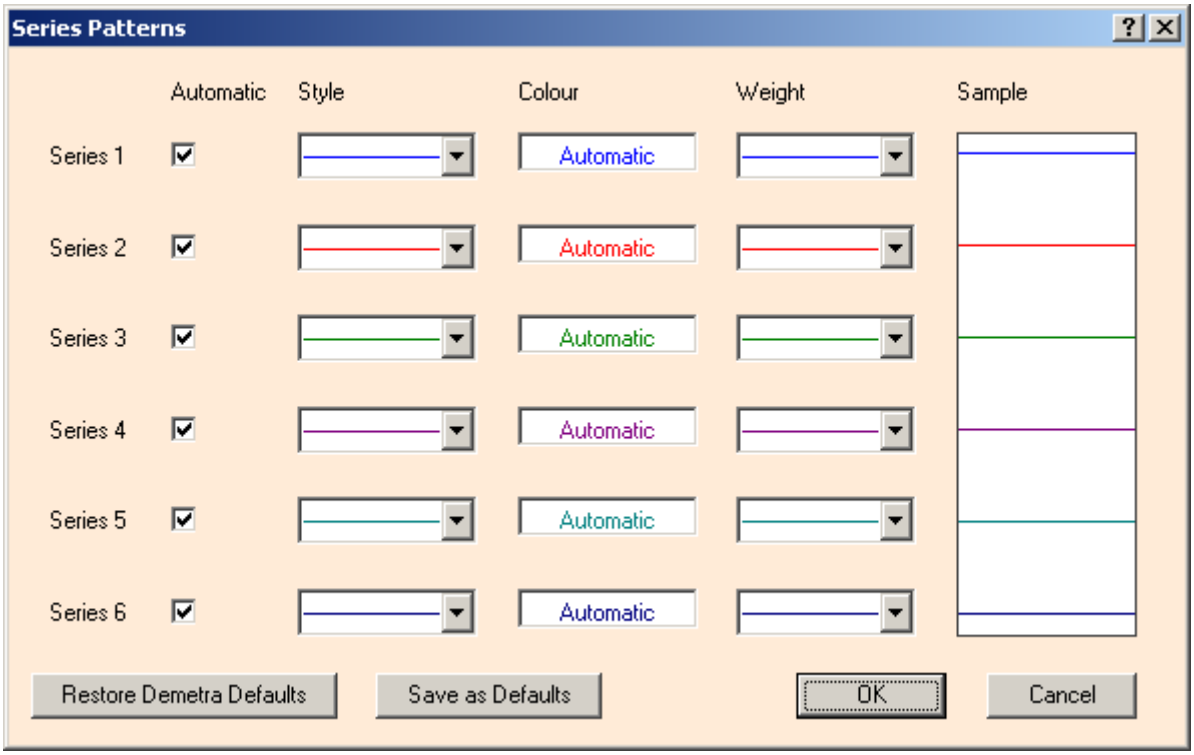
Use the button "Zoom the 100%" to automatically re-scale the graph to the original sizing. By default (except for some spectrum series), the scaling is calculated to show the complete series graph by optimally filling the plot area. The default scaling always depends on the size of the graph area and the screen resolution.

Accept your choice with the "OK" button.

You can cancel the function with the "Cancel" button.

4.4.3. Customised series pattern

Use this dialog box to customize the appearance of the graphed lines. You can change the line style, colour and width. These settings are also applied to printed or copied graphs (if possible).


Series Patterns
Automatic
Style
Colour
Weight
Sample
Series 1
Series 2
Series 3
Series 4
Series 5
Series 6
Automatic
Restore Demetra Defaults
Save as Defaults
OK
Cancel

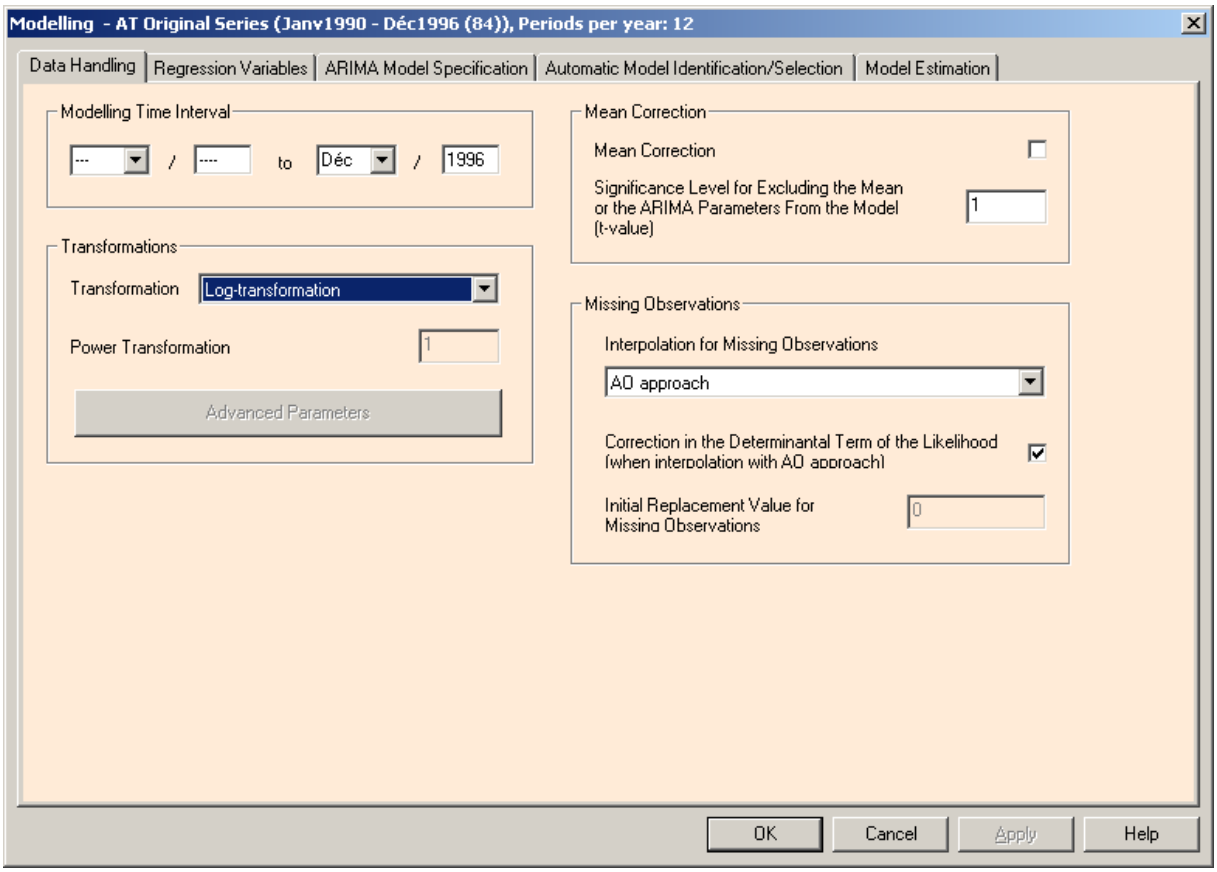
4.5. Parameters for the Modelling Specifications

These dialogs allow modifications of the modelling specifications of one of the models.

First, you will need to select the model for which you want to change some parameters.
You can customise settings for the
- Data Handling (transformations, interpolations, mean correction)
- Regression Variables (trading day and Easter effect, outliers)
- ARIMA model specification or Automatic Model Identification/Selection
- Model Estimation

4.5.1. Data handling

This dialog box allows modifications of the modelling specifications of the selected model concerning the "Data Handling" (transformations, interpolations, mean correction).



Transformations

A transformations can be appropriate if the amplitude of the seasonal fluctuations of the series are correlated to the level of the series. This indicates a non-additive relationship between the components of the series that are adequately transformed to obtain an additive structure necessary for the decomposition.

Transformation
- Logarithm: The logarithm transformation is performed. Choose this option if the time series graph visually showed the mentioned behaviour.
- None: No transformation is performed. Choose this option if the time series graph does visually not

show the mentioned behaviour.
- Test for log-transformation: The programme tests for the necessity of a logarithm transformation of the original series (TRAMO: based on a trimmed range-mean regression, complemented with the BIC values, X-12-ARIMA: based on the AICC values). No transformation is performed if a original series contains zeros or negative values.
- Square root transformation: The square root transformation is performed (only for X-12-ARIMA).
- Inverse transformation: The inverse transformation is performed (only for X-12-ARIMA).
- Logistic transformation: The logistic transformation is performed (only for X-12-ARIMA).
- Power transformation: A transformation is performed according to the inputted power value (only for X-12-ARIMA).

Default value: Logarithm

Power transformation (only for X-12-ARIMA)
Transform the series using a Box-Cox power transformation. The "Transformation" list box must be set to "Power transformation". Here are some examples of usual power transformation values:
- 1: no transformation
- 0: logarithm transformation
- 0.5: square root transformation
- -1: inverse transformation

Default value: 0

Note: X-12-ARIMA: There are restrictions on the values used in these arguments when pre-adjustment factors for seasonal adjustment are generated from a regARIMA model. If a Box-Cox or logistic transformation is specified in conjunction with a length-of-month (or leap year) adjustment and/or user-defined prior-adjustment factors, the time series is first adjusted for length-of-month and/or prior factors, and then Box-Cox or logistically transformed. If both length-of-month and prior-adjustment factors are specified, then combined adjustment factors (length-of-month x prior adjustment) are used. Length-of-quarter and leap year adjustments are handled in the same way.

Mean Correction

The residuals of the ARIMA model are supposed to follow a normal distribution that includes a mean of zero. Hence, a preceding mean correction may be adequate. TRAMO will set this option to "No" if the mean correction is not necessary.

Mean Correction
- Yes: Perform a mean correction (for TRAMO: only done if necessary)
- None: Do not perform a mean correction

Default value: Yes

Significance Level for Excluding the Mean or the ARIMA Parameters From the Model (t-value) (only for TRAMO/SEATS).
This value is used in the last step of the automatic model identification in TRAMO.
Default value: 1.0

Missing Observations

In X-12-ARIMA, when the programme encounters a missing value in the original series, it inserts an additive outlier for that observation time into the set of regression variables, and then replaces the missing value code with the value "Initial Replacement Value for Missing Observations" that should be large enough to be considered an outlier during model estimation. After the regARIMA model is estimated, the program adjusts the original series using factors generated from these missing value outlier regressors. The adjusted values are estimates of the missing values. Thus, the interpolation for missing values requires a regARIMA model to be estimated.
The following options can be set for TRAMO/SEATS.
Interpolation for Missing Observations
- AO approach: Missing observations are treated as additive outliers (initial values are constructed as the sum of the two adjacent observations; interpolation is always performed).
- Skipping approach: Interpolation of unobserved values and missing observations treated using the

skipping approach
- None: No interpolation of unobserved values and missing observations treated using the skipping approach

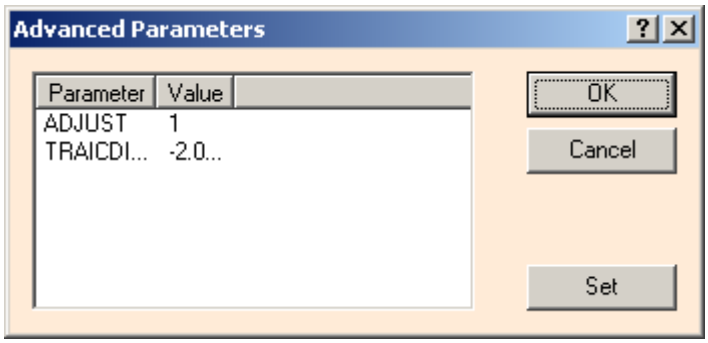
Default value: Yes

Correction in the Determinantal Term of the Likelihood (when interpolation with AO approach) (only for TRAMO/SEATS).
- Yes/No

Default value: Yes

Note: If the "Correction in the Determinantal Term of the Likelihood" and the additive outliers approach are selected, the determinantal term in the function to be minimised is adjusted so that it coincides with that of the function used in the skipping approach.
The automatic model identification facility of Tramo can be used in the presence of outliers only if these are treated with the additive outliers approach. When this is the case, in order to identify the degree of differencing, the missing observations are first replaced with tentative values which are the sum of the two adjacent observations. Then, for ARMA model identification of the differenced series, the program estimates all regression parameters, included those of the missing observations. In this way, the missing observations are implicitly estimated as the difference between the tentative value and the estimated regression parameter of the additive outlier.

Advanced Parameters (only for X-12-ARIMA)



ADJUST
- 2/3/4/1

Perform length-of-month adjustment on monthly data (2), length-of-quarter adjustment on quarterly data (3), leap year adjustment of monthly or quarterly data (4), or do neither (1). Do not use the adjust argument if a trading day correction with 7 variables is specified.
Default value: 1

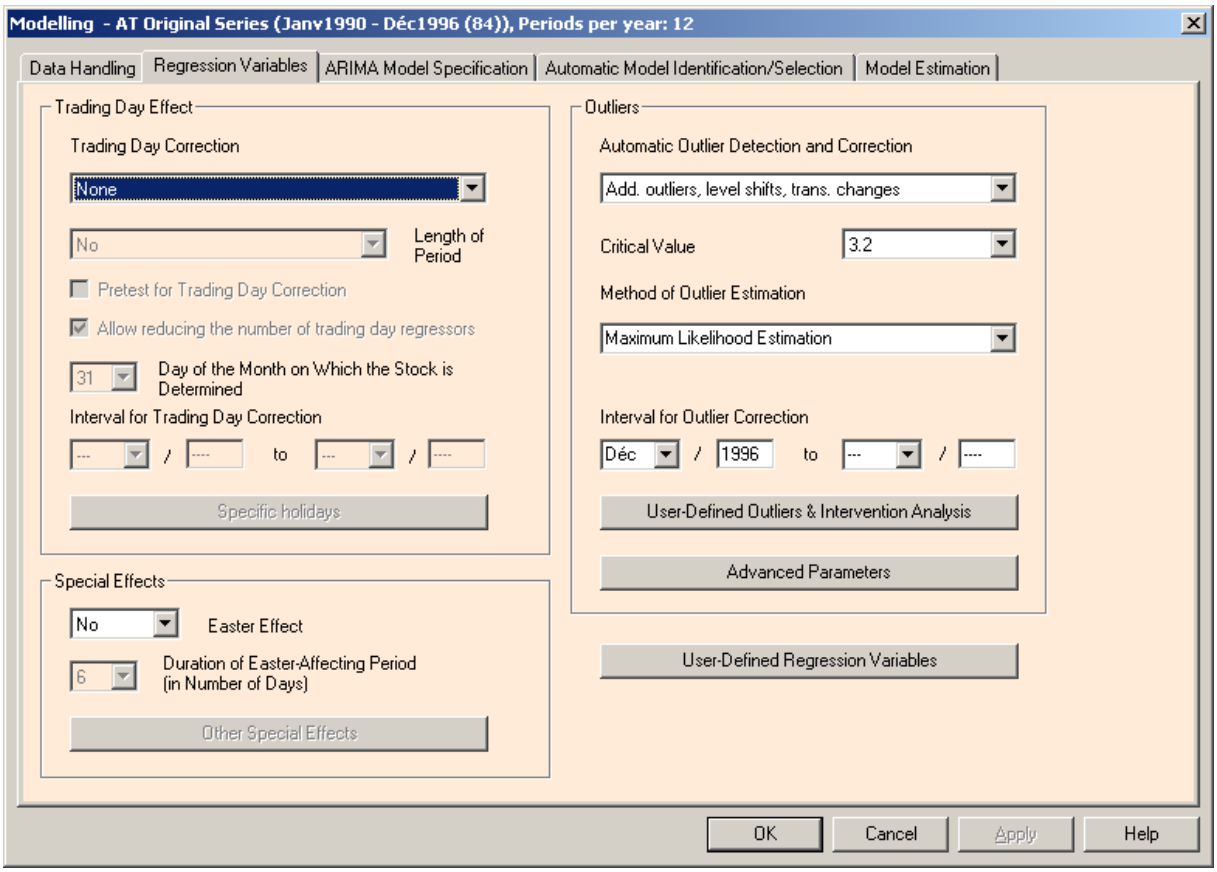
TRAICDIFF
- number > 0

Defines the difference in AICC needed to accept no transformation when the automatic transformation AIC test is invoked (pre-test for log-transformation).
Default value: 2.0

Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

4.5.2. Regression variables

This dialog box allows modifications of the modelling specifications of the selected model concerning the "Regression Variables" (e.g. trading day and Easter effect, outliers).



Correction for calendar effects

Trading Day Effect

Many economical activities are strongly influenced by calendar effects like varying number of trading days and holidays in each recorded period. In order to improve the seasonal modelling and the trend estimation, such effects should be eliminated before the decomposition.
In general, very short time series are adjusted with few trading day variables (1 or 2), whereas longer time series can be adjusted using 6 or 7 trading day regressors.

Trading Day Correction

- Working day: There are no differences in the economical activity between the working days (Monday to Friday) but between these and non-working days (Saturday, Sunday). Hence, 1 regression variable is created that expresses the varying number of these days.
- Trading day: There are differences in the economical activity between all days of the week. Hence, 6 regression variables are created that expresse the varying number of these days.
- None: No transformation is performed. Choose this option if the time series graph does visually not show the behaviours mentioned above.
- Flow effect (stock effect): Use this option if your series are stock series: The activity is measured on a special day of the month, and there are differences in the economical stock activity between all days of the week. The weekday (Monday, Tuesday, ..., or Sunday) of the given day of the month (e.g. the last day of the month) is considered to create 1 regression variable (only for X-12-ARIMA).

Default value: None

Note: Since TRAMO/SEATS and X-12-ARIMA do not decide between these types of trading day effects, the user must do this choice depending on the mean time series length and on the user's knowledge about the type of time series (e.g. trade, employment, production index, accounts, etc.) or let this choice up to Demetra that performs an automatic reduction of the number of trading day regressors.
In general, very short time series should rather be adjusted with few trading day variables (1 or 2),

whereas longer time series may be better adjusted using 6 or 7 trading day regressors. In the case of a doubt try several options and decide yourself for the best one (e.g. using the number of series with rejected adjustments found or the goodness of the diagnostic statistics for each trial) or leave the choice to Demetra.

Length of Period
- Yes: The total number of days per period is (additionally) considered
- No: Do not perform a correction for this effect.

Default value: No

Note: The regression variables as mentioned above are automatically created by the programme that incorporates the calendar for the years from 1901 to 2099.

Pretest for Trading Day Correction
- Yes: The programme tests for the necessity of a correction for trading day (or working day) effects in the original series (TRAMO: by running a regression on the Airline model, X-12-ARIMA: based on the AICC values) using the specified type of trading day effect.
- No: A pre-test trading day (or working day) effects is not performed.

Default value: No

Day of the Month on Which the Stock is Determined
- number > 0

Defines the difference in AICC needed to accept no transformation when the automatic transformation AIC test is invoked (pre-test for log-transformation).
Default value: 2.0

Specific holidays (e.g. depending on regions or economical activities like banking) may be added by the user after clicking on the corresponding button.

Easter Effect Correction:

Economical activities can be influenced by the varying number of Easter preceding days (with higher economical activities) that fall in either of the months March and April. In order to improve the seasonal modelling and the trend estimation, such an effect should be eliminated before the decomposition.

The number of Easter affected days per year may be adapted to the type of time series if the user possesses more detailed information on the economical background. However, a default value is given that result from many practical experiences.
The corresponding regression variable is automatically created by the programme that incorporates the calendar for the years from 1901 to 2099.
- Pre-test: The programme tests for the necessity of a correction for the Easter effect in the original series (TRAMO: by running a regression on the Airline model, X-12-ARIMA: based on the AICC values).
- Yes: The correction for the Easter effects is performed.
- No: The correction for the Easter effects is not performed.

Please refer to the manuals of TRAMO/SEATS and X-12-ARIMA for more information on the parameter modalities and meanings.

Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

Correction for special effects

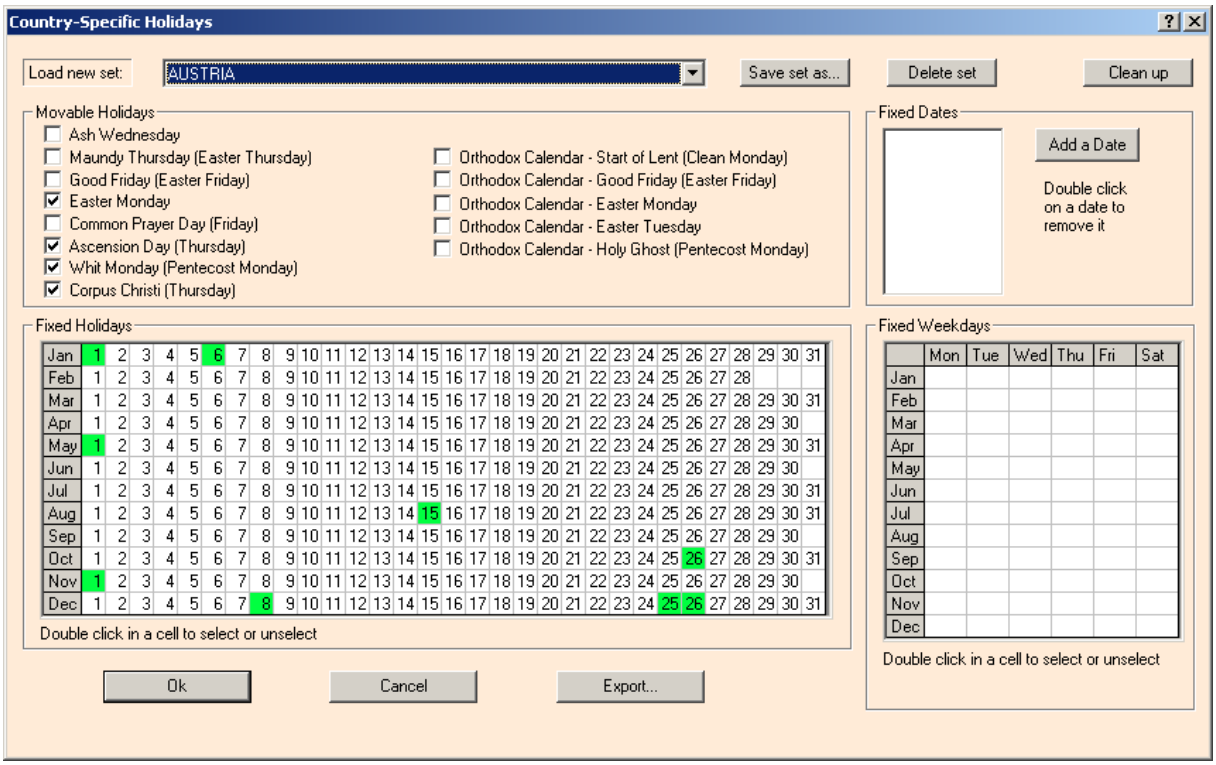
This dialog box allows modifications of the modelling specifications of the selected model concerning the correction for the Labour day and the Thanksgiving effects. This kind of correction is only available for X-12-ARIMA.

Please refer to the manual of X-12-ARIMA for more information on the parameter modalities and meanings.

Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

Specific holidays

This dialog allows specifying a particular holiday set (e.g. depending on regions or economical activities like banking) to improve the internally generated trading day variables. These parameters are currently only available in TRAMO/SEATS.



DEMETRA includes predefined holidays sets for the main Western-European countries, Japan and the USA. You can modify and save them if necessary. It is possible to redefine these sets to their Demetra defaults by clicking on the "Delete set" button. They are automatically reset in this case, but you cannot completely delete them.

It is possible to define additional holiday sets for your own series, country or branch.

Ash Wednesday

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Maundy Thursday (Easter Thursday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.

For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Good Friday (Easter Friday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Easter Monday

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.

Easter Sunday is the date of the annual celebration of Christ's resurrection. The aim of the Easter Dating Method is to maintain, for each Easter Sunday, the same season of the year and the same relationship to the preceding astronomical full moon that occurred at the time of his resurrection in 30 A.D.
Easter Sunday is the Sunday following the Paschal Full Moon (PFM) date for the year. (Paschal is pronounced "PAS-KUL", not "pas-chal"). See Christian Prayer Books for proof of this concise definition. From 326 A.D., Easter Sunday is always one of the 35 dates March 22 to April 25.

Common Prayer Day (Friday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Ascension Day (Thursday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Whit Monday (Pentecost Monday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Corpus Christi (Thursday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. It has always the same distance (in days) to the Easter Sunday.
For more information about the determination of the Easter Sunday date, please see the help for Easter Monday.

Orthodox Calendar - Start of Lent (Clean Monday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. An Orthodox movable feast has always the same distance (in days) to the Orthodox Easter Sunday.
For more information about the determination of the Orthodox Easter Sunday date, please see the help for Orthodox Easter Monday.

Orthodox Calendar - Good Friday (Easter Friday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. An Orthodox movable feast has always the same distance (in days) to the Orthodox Easter Sunday.
For more information about the determination of the Orthodox Easter Sunday date, please see the help for Orthodox Easter Monday.

Orthodox Calendar - Easter Monday

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. An orthodox movable feast has always the same distance (in days) to the orthodox Easter Sunday.

Orthodox churches became fully autonomous in 1054 A.D., and celebrate their Easter always on the basis of the Julian calendar and the "19 PFM dates" table. The Julian calendar date Thursday October 4, 1582 was followed by the Gregorian calendar date Friday October 15, 1582. The 10 dates October 5 to 14 were removed.
Consequently, their Easter Sunday dates are identical up to 1582, then from 1583 onwards often differ from those of Western churches.
In some years the Orthodox Easter Sunday occurs on the same day as the Western Easter Sunday. For example, this occurred in 1990 because the Western Easter Sunday date of (Gregorian calendar) April 15, 1990 is the same as the Orthodox Easter Sunday date of (Julian calendar) April 2, 1990. In most years, Orthodox Easter follows Western Easter by one or more weeks.
To determine the Orthodox Easter Sunday date, it is first necessary to find the Julian Easter Sunday date, then to add the number of days which have been "skipped" in the Gregorian calendar.

Orthodox Calendar - Easter Tuesday

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. An Orthodox movable feast has always the same distance (in days) to the Orthodox Easter Sunday.
For more information about the determination of the Orthodox Easter Sunday date, please see the help for Orthodox Easter Monday.

Orthodox Calendar - Holy Ghost (Pentecost Monday)

Select this option, if the specific calendar contains this movable holiday.
A movable holiday (or Moveable Feast day) changes the date every year. An Orthodox movable feast has always the same distance (in days) to the Orthodox Easter Sunday.
For more information about the determination of the Orthodox Easter Sunday date, please see the help for Orthodox Easter Monday.

Fixed holidays

Double-click a field with the corresponding month/day in this table to specify a fixed holiday (holiday with the same date every year).
A second double-click unselects the corresponding date.

Add a fixed date

This button gives access to a dialog for choosing and adding a single calendar date to the holiday set.

List of fixed dates

This list contains all fixed single calendar dates that are included as holidays in the holiday set.
Click on the button next to the list to add a new date.
Double click on a date in the list to remove it.

List of fixed weekdays

This table contains all yearly repeated holidays (included in the holiday set) that are celebrated at a fixed weekday in a month, for instance every second Tuesday in June.
Double click on a cell to select or unselect a weekday. An edit box allows than to set the number of this weekday celebrated per month, for instance, if the first and second Tuesday in June are holidays then type 2. Type 0 to remove this fixed weekday holiday from the list.

Number of weekday holidays in the selected month

Type the number of celebrated weekdays for the selected month, for instance, type 2 if the first and second Tuesday in June are holidays.
Type 0 to remove this fixed weekday holiday from the list.
Only numbers from 0 to 4 are allowed since a month is has (approximately) four weeks.

Save the holiday set

Use this button to save your customised holiday set to the Windows registries (previous win.ini file). You will then be able to reuse the set for other time series adjustments.
You can modify predefined holiday sets or add new user-defined holiday sets.
Please write to the current maintenance team of Demetra to include the national holiday set of your country as a pre-defined holiday set.

Export holiday set

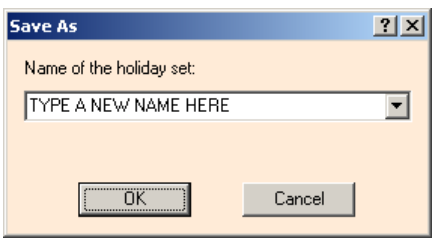
Use this button to create holiday variables from the current selections and save them into a text or an Excel file. Holiday variables are normally used to improve the internally generated trading day variables. This functionality is currently only available in TRAMO/SEATS.

Delete the holiday set

Use this button to delete a user-defined holiday set from the Windows registries (previous win.ini file), or to reinitialise a predefined holiday set. You can not completely delete predefined holiday sets.

Saving of a holiday set

This dialog box allows the customisation of the country- or branch- specific holidays set that was defined in the former dialog box. This option is only available for TRAMO/SEATS.



Type a name for the holiday set in the dialog box and choose "OK" to save the set under this name.

You can use names of already existing holiday sets. These will be updated in this case.

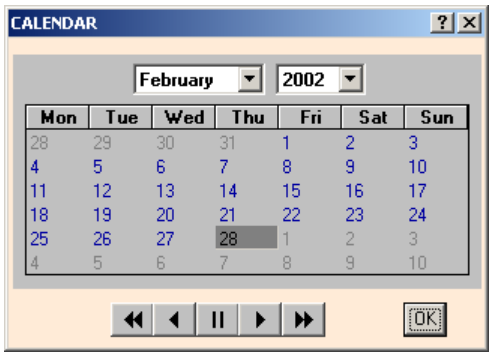
Demetra includes predefined holidays sets for the main Western-European countries, Japan and the USA. You can modify them if necessary. It is possible to redefine these set to the defaults by clicking on the "Delete set" button in the former dialog box. Their are automatically reset in this case, but you can not completely delete them.

"Cancel" aborts the saving of the holiday set.

Note: The set is not saved to the hard disk but an entry is created or updated in the Windows registries.

Selection of an calendar date

This dialog box allows choosing a date from the calendar.



Click on "OK" to accept your choice. Click in the upper right corner of the dialog box to discard the function and close the dialog box.

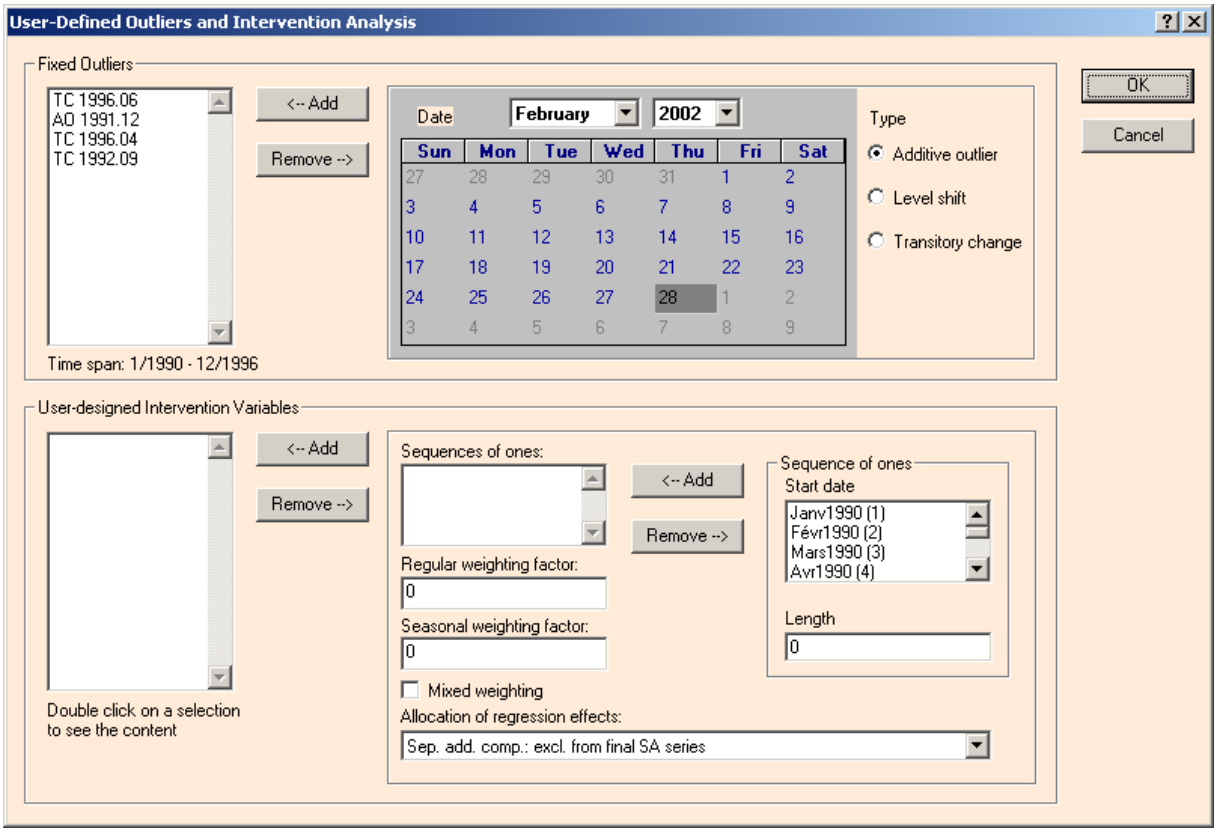
The lower buttons have the following meaning:
II : jump to today
> : jump to the same day in the next month
< : jump to the same day in the previous month
>> : jump to the same day in the next year
<< : jump to the same day in the previous year

Please refer to the manual of TRAMO/SEATS for more information on the parameter modalities and meanings.

Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

User-defined outliers and intervention analysis

This dialog box allows modifications of the modelling specifications of the selected model concerning the fixed outliers and user-defined intervention variables. The input of the later ones is only available for TRAMO/SEATS.



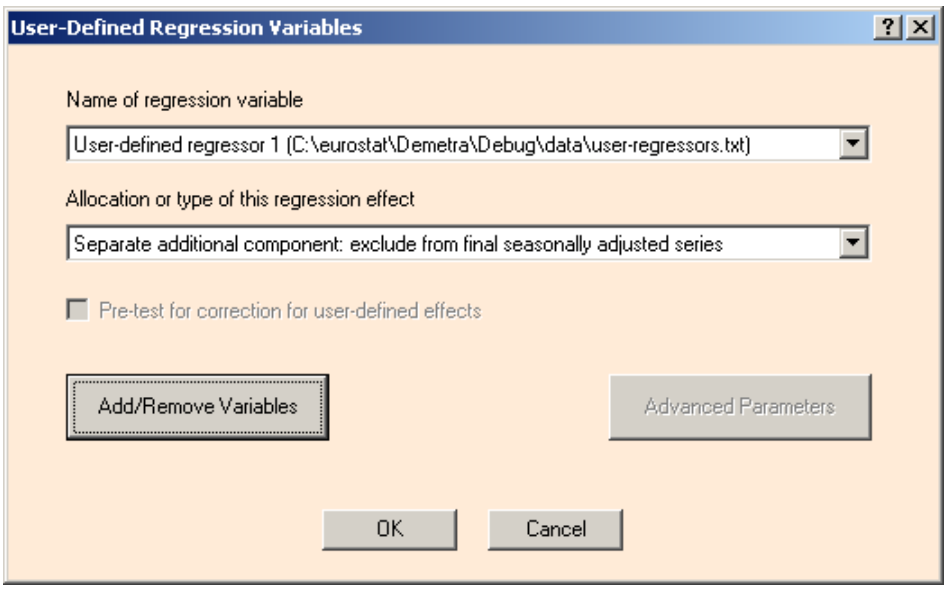
You can add or remove fixed outliers or user-defined intervention variables (you may have detailed information on economic events e.g. strikes that effects the time series and that can be modelled by appropriate outliers or intervention variables). Even if your time series is monthly, please enter a concrete date when you add a new fixed outlier.

Please refer to the manual of TRAMO/SEATS respectively X-12-ARIMA for more information on the parameter modalities and meanings (especially about the construction of user-defined intervention variables).

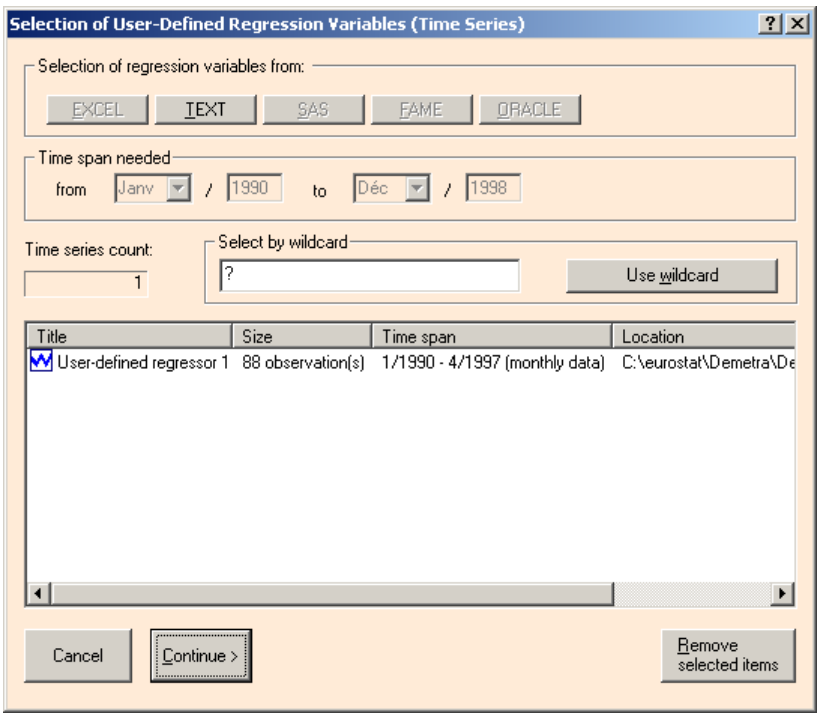
Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

User-defined regression variables

This dialog box allows modifications of the modelling specifications of the selected model concerning the user-defined regression variables.



You can add or remove user-defined regression variables (you may have detailed information on economic events that effects the time series and that can be modelled by appropriate regression variables). You must create these variables yourself and save them in the same way as your input series (as time series with an appropriate format - understandable by Demetra - in a database of the same type as the input series). The button “Add/Remove Variables” will lead to the following screen:



All time series that are shown in this screen are loaded and used as regression variables. To add other time series use the one of the four buttons at the top that is enabled. To remove time series, select them by clicking with the mouse (you may use the SHIFT, CTRL, HOME or END key or combinations of them) to select several time series), and use the button “Remove selected items”.

Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

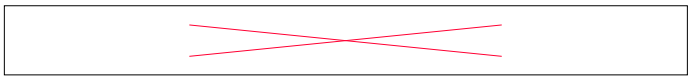
Automatic outlier detection and correction

Define the types of outliers to be automatically detected and corrected in all currently selected time series.
The default option detects the 3 types of outliers:
Additive outlier: a singular exceptional value
Level shift: a sudden permanent change in the level of the series
Transitory change: a sudden change in the level of the series that slowly returns to the previous state.

Critical value for outlier detection

The regression t-value of the presumed outliers (indicating their significance) is compared to the given critical value. Only the series values with a t-value higher than the critical value are identified as real outliers.
Increasing the critical value will potentially reduce the number of outliers detected, whereby decreasing the critical value will potentially augment the number of outliers detected.
The default critical value depends on the length of the modelling span.

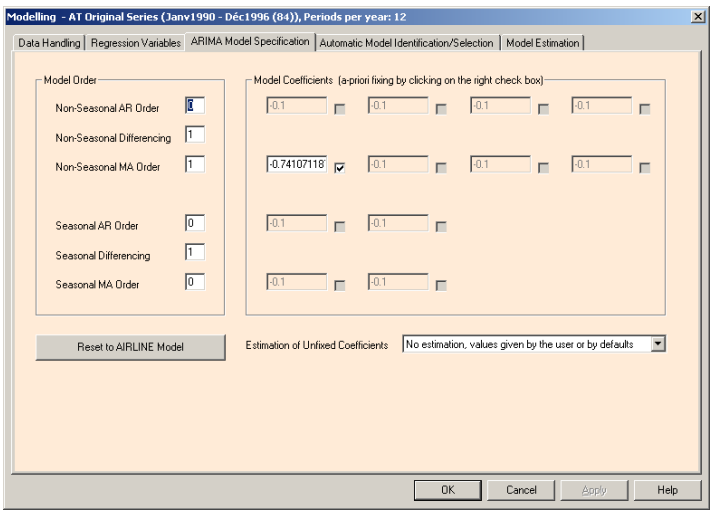
Tramo:
- Length <= 50: critical value = 3
- Length <= 450: critical value = 3 + 0.0025*(Length-50)
- Length > 450: critical value = 4

X-12-Arima:
- Length > 2: critical value = 

See the user manual of the original SA methods for more detailed information.

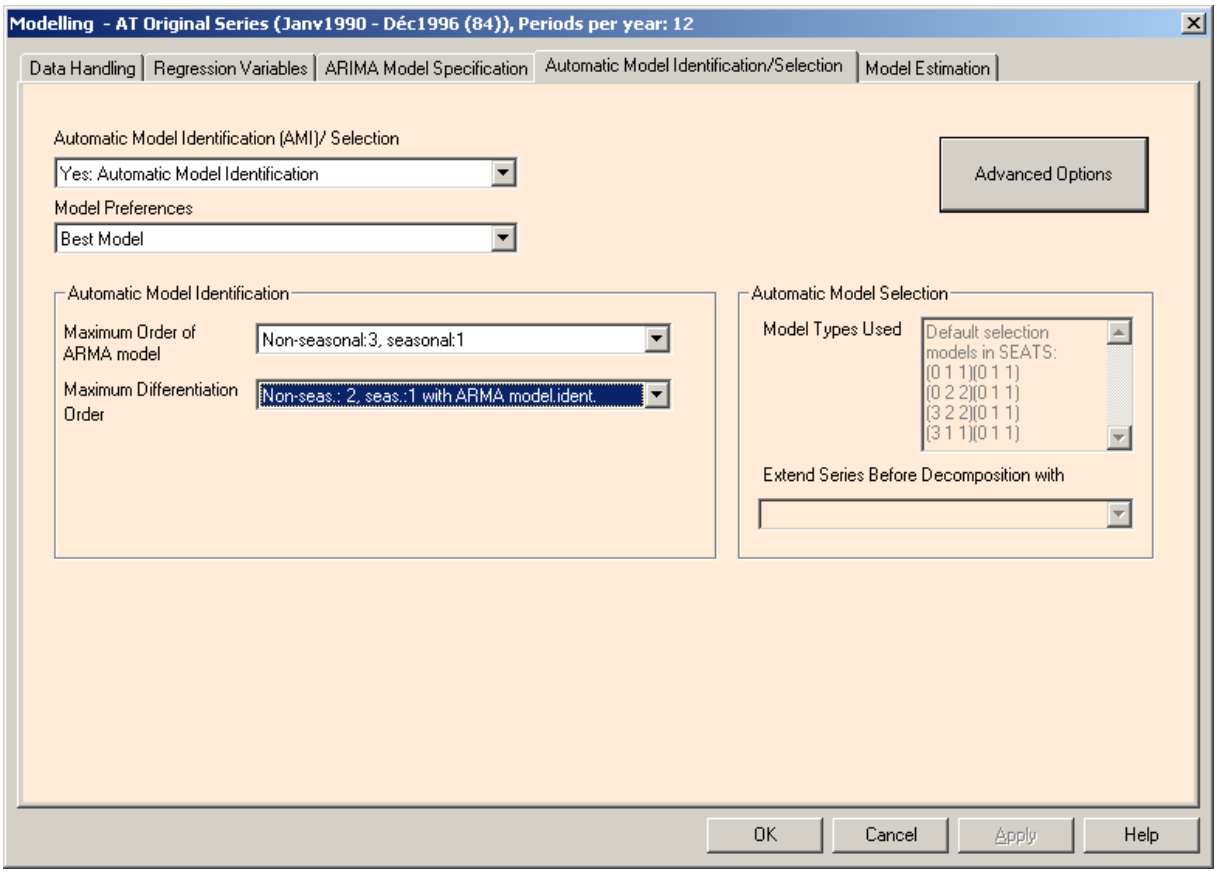
4.5.3. ARIMA model specification, automatic model identification/selection, model estimation

The corresponding dialog boxes allow modifications of the modelling specifications of the selected model concerning the "ARIMA Model Specification" and the "Automatic Model Identification/Selection".



Estimation of a specific ARIMA model

These options give access to the specification of a specific seasonal ARIMA model that parameters will be estimated for all currently selected time series. The scientific symbolic for such an ARIMA model is (p d q)(P D Q) whereby default values of (0 1 1)(0 1 1) are used. Empirical tests have shown that these default values are suitable for more than 50% of the real economic time series. They have been determined using a well-known series of AIRLINE passengers, thus the default model is also called the AIRLINE model.



Automatic identification and estimation of the ARIMA model

Tramo will try to identify the orders of the most suitable seasonal ARIMA model and estimate their corresponding model parameters for each currently selected time series in a completely automated way.

Automatic selection and estimation of the ARIMA model

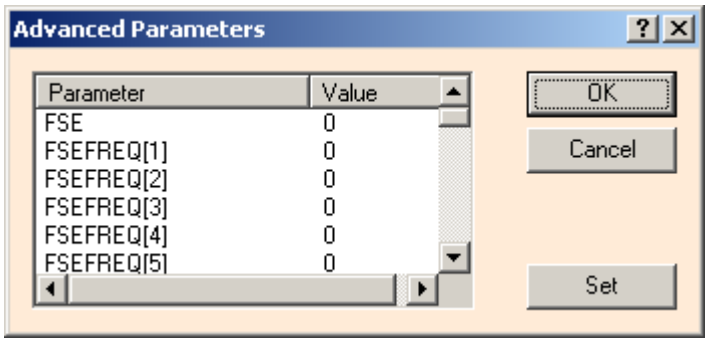
X-12-Arima (respectively Seats) will try to choose the orders of the seasonal ARIMA model from a given limited list of models and estimate their corresponding model parameters for each currently selected time series in a completely automated way.
For X-12-Arima, the list of models must be contained in the file “x12a.mdl” that should be made available in the Demetra working directory. To limit computation time, the list should not be too long (the default are 5 models). The defaults were chosen in empirical tests to be most suitable for (US) economic time series. It might be necessary to adapt these default models to the specific characteristics of your series.
Seats has a fixed internal list of models that can not be changed.

Please refer to the manual of TRAMO/SEATS for more information on the parameter modalities and meanings.

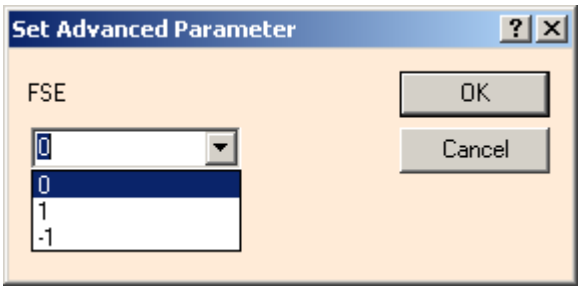
Remark: The changes to the parameters will only be applied, if you quit the "Specification" dialog boxes using the "OK" button. No modifications will be applied if you quit with "Cancel".

4.5.4. Advanced parameters

This dialog box let you customise some advanced parameters.



All possible modalities of an X-12-ARIMA parameter can be found in Demetra's formats of the X-12-Arima parameters (see page 110) .
To modify a parameter, select it with the mouse and click the "Set" button.
Accept your modifications with the "OK" button.
You can discard all your modifications with the Cancel button.



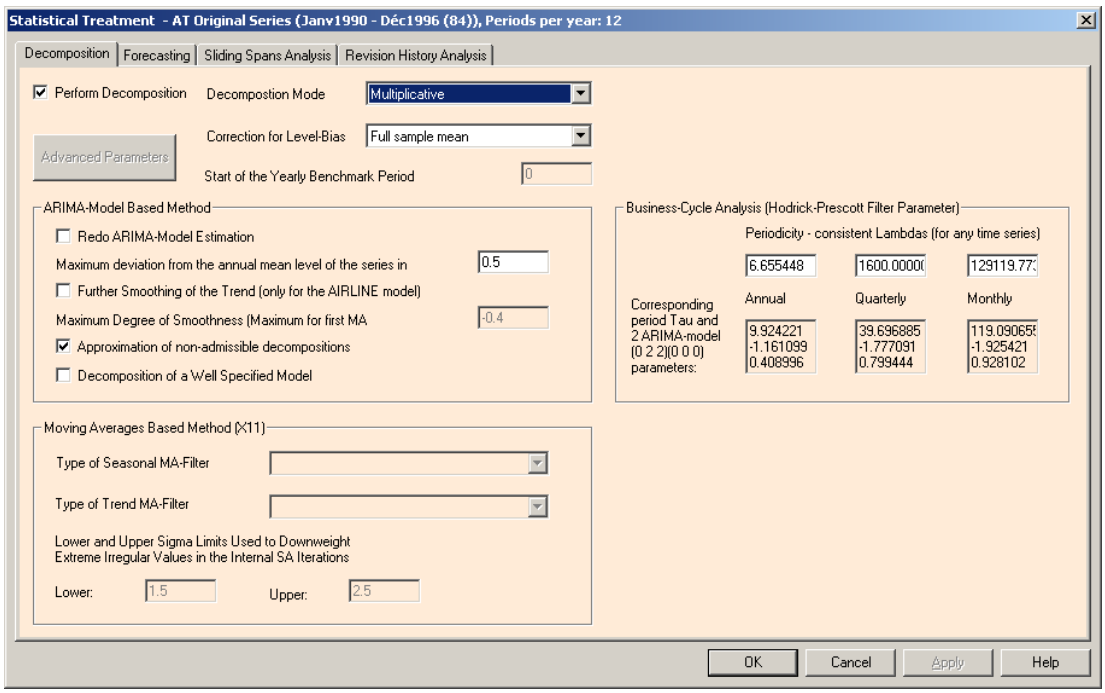
To modify a parameter, type the new value in the edit box. Accept your modification with the "OK" button. You can discard your modification with the Cancel button.

4.6. Specifications for the Statistical Treatment

These dialogs allow modifications of the specifications for the decomposition, forecast, revision history analysis and sliding spans analysis. You will need to select the model first, for which you want to change some parameters.

4.6.1. Decomposition, Forecasting

The corresponding dialog boxes allow modifications of the specifications for the statistical treatment for the selected model concerning the "Decomposition" (ARIMA-model based method or MA-based procedure "X11") and the "Forecasting".



Correction for level-bias in seasonally adjusted series

These options allow correcting for the bias that may occur in multiplicative decomposition when the period-to-period changes are relatively large when compared to the overall mean. This bias implies an underestimation of the seasonally adjusted series and of the trend in levels, caused by the fact that geometric means underestimate arithmetic means.

Full sample mean:
Seats (only for multiplicative models): A correction is made for the overall bias for the full length of the series and the forecasting period.
BIAS=1, ----
Annual mean:
Seats (only for multiplicative models): A correction is made so that, for every year (including the forecasting period), the annual average of the original series equals the annual average of the seasonally adjusted series, and also (very approximately) equals the annual average of the trend.
X-12-Arima: The seasonally adjusted series is modified to force the yearly totals of the seasonally adjusted series and the original series be the same.
BIAS=-1 x11{ force = totals }
None:
BIAS=0 x11{ }

Remark: The bias correction can degrade the quality of the seasonal adjustment, especially when the seasonal pattern is undergoing change. It is not natural if trading day adjustment is performed because the aggregate trading day effect over a year is variable and moderately different from zero.

Further smoothing of the trend

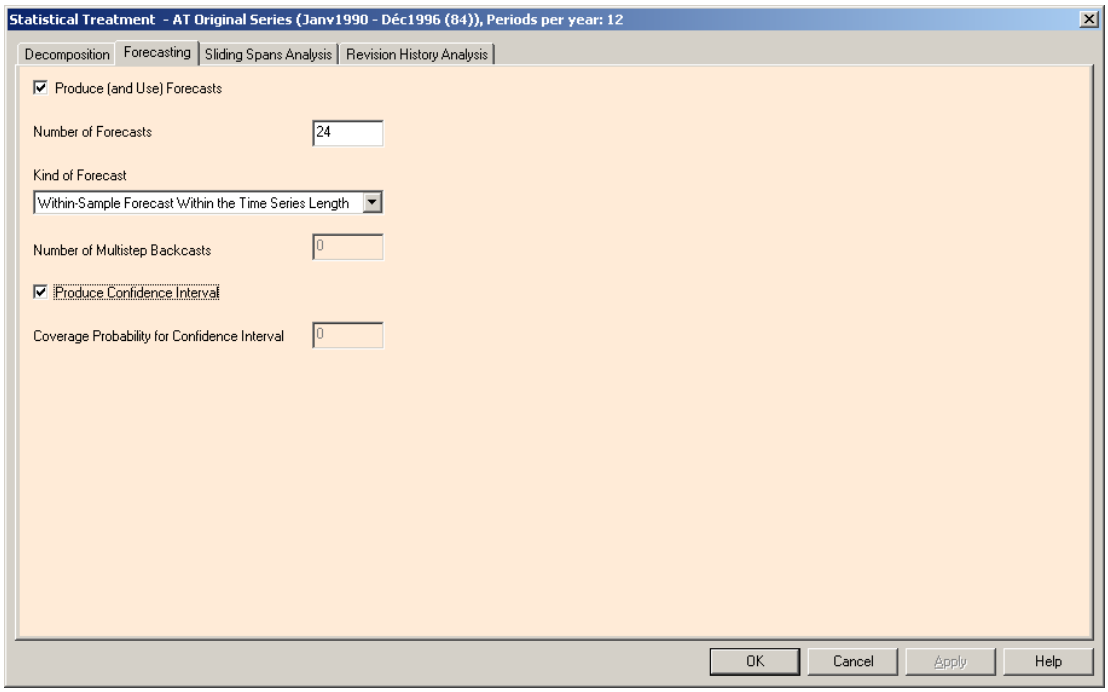
Only for Seats: For the default model, a smoother trend can be obtained without significantly affecting the seasonally adjusted series. This is done by decreasing the value of the coefficient of the regular moving average factor (1 + θB).
SMTR=1 ----

Maximum deviation from the annual mean level in %

Only for Seats: When the average value of the differences (in absolute value) between the annual means of the original and seasonally adjusted series is larger than the value given here, the Annual Mean correction is enforced. The given number is expressed in % points of the level of the series.
MAXBIAS=k (k>0) ----

Maximum degree of smoothness

Only for Seats: When the estimated coefficient of the regular moving average factor is smaller or equal than the value given here, no further smoothing of the trend is done since the trend is already smooth enough.
If not, then the estimated coefficient is replaced by the value given here.
THTR=k (-1<k<0) ----



Number of forecasts

Specify the length of the 1 step ahead forecasts produced using the estimated Regression-ARIMA model for each time series.
Forecasts are very important to improve the estimation of the series components (trend, seasonal factors) at the recent end of the series.

Tramo/Seats use a default forecast length of 2 years (minimum 8 periods) while X-12-Arima defaults to 1 year. Demetra did not change these method-specific default values.

4.6.2. Business-cycle analysis

Specification of the Hodrick-Prescott filter parameter λ

Specify here the Hodrick-Prescott filter parameter λ for one of the 3 time series periodicities. Demetra will automatically calculate the adequate parameter λ (Lambda) for the other series periodicities.
Even if your time series periodicity is not included in the 3 examples, Demetra will calculate the corresponding parameter:

Practically, Demetra first obtains the equivalent period τ (Tau) that is the maximum length of the cycles extracted (expressed in number of periods). When you divide this number of periods by the series periodicity (number of periods per year) you obtain the maximum length of the cycles extracted expressed in number of years - that should of course be independent on the time series periodicity.
Second, Demetra calculates the 2 corresponding moving average coefficients for the ARIMA-model (0 2 2)(0 0 0), which is used as Hodrick-Prescott filter.

The default parameter λ (Lambda) for quarterly series is 1600. That value is a "de facto industry standard" (European Central Bank (2000)) that corresponds to a maximum cycle length of about 10 years. The derivation of periodicity-consistent λ's (Lambda) and the ARIMA model coefficients is described in "Time Aggregation and the Hodrick-Prescott Filter" by Agustín Maravall and Ana del Río (Banco de España).

The **Business-Cycle series** is obtained by sending the Forecasted Stochastic Trend-Cycle series from a first normal Tramo/Seats run (together with the derived ARIMA model) to Seats and recovering the Irregular Component.

The **Long-Term Trend** is the difference between the Final Trend-Cycle from the first run and the Business-Cycle.

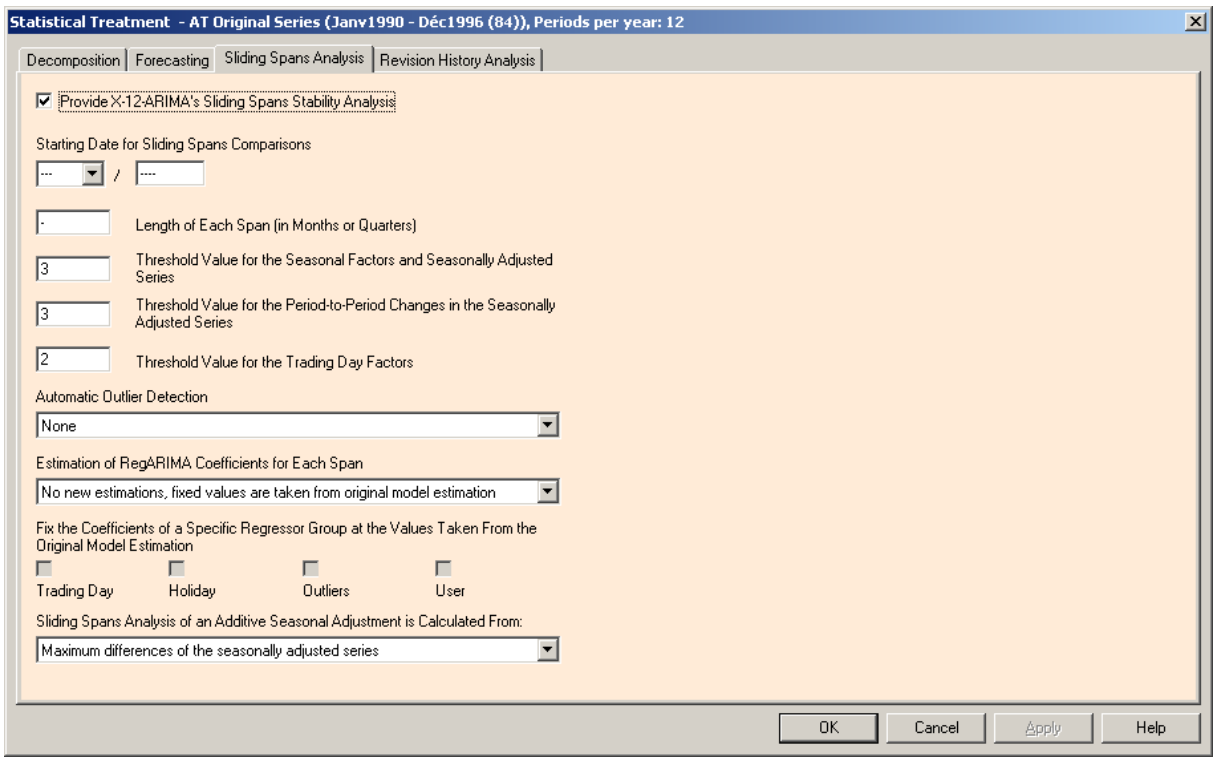
The "**Business-Cycle + Irregular**" series is the difference between the Final SA series from the first run and the Long-Term Trend.

> *Remark: Level-shifts are contained in the Long-Term Trend, and thus not in the "Business-Cycle + Irregular" series.*

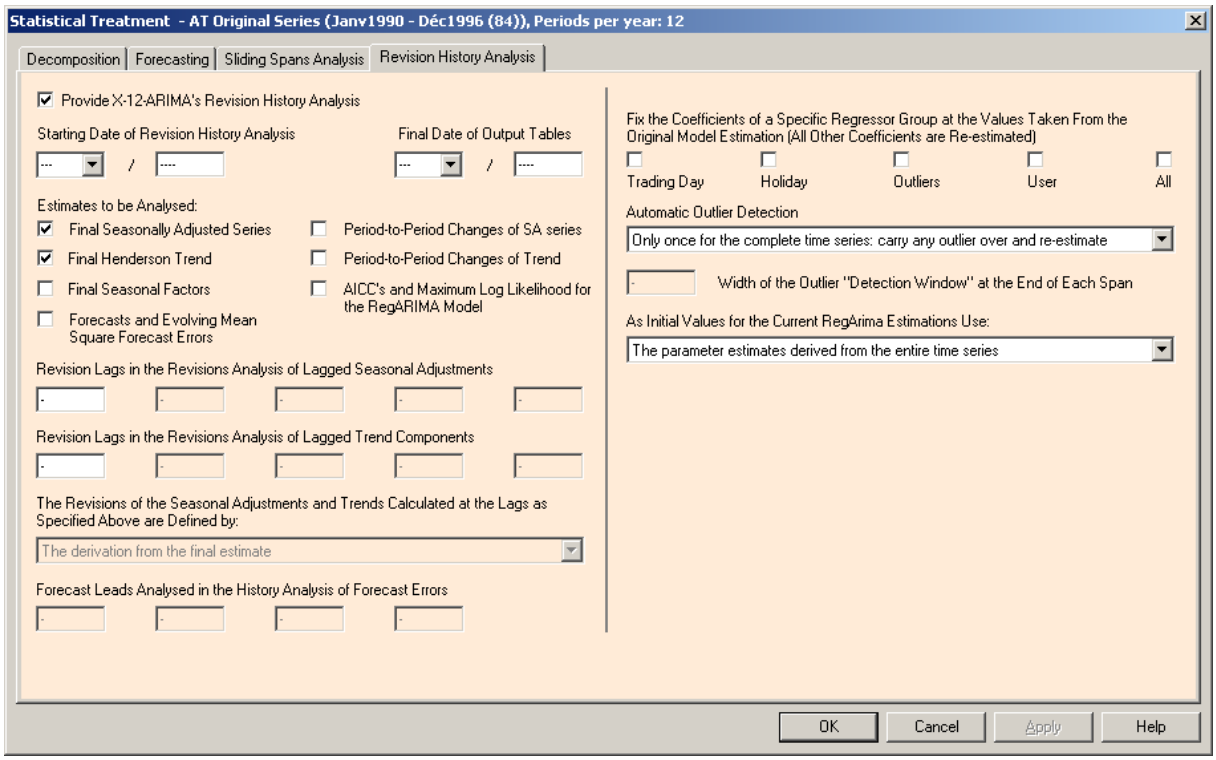
Please refer to the manuals of TRAMO/SEATS and X-12-ARIMA for more information on the parameter modalities and meanings.

4.6.3. Sliding spans analysis, revision history analysis

The corresponding dialog boxes allow modifications of the specifications for the X-12-Arima analysis tools for the selected model.



Please refer to the manual X-12-ARIMA for more information on the parameter modalities and meanings.



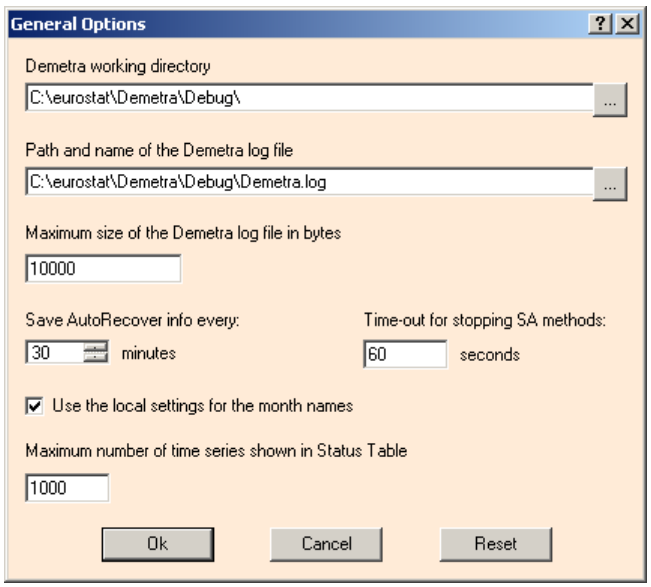
Please refer to the manual X-12-ARIMA for more information on the parameter modalities and meanings.

Chapter 5 :

Special tools

5.1. General Application Options

Demetra allows configuring some general options like working directory, path, name and size of the log file and the time interval for the AutoRecover savings.



Demetra working directory and log-file

Enter the drive and path of the directory that is used for the saving of permanent or temporary input, graph and output files. This should be a directory on the local PC. That is especially important when you use a server-based installation of Demetra.
By default, the directory of the executable Demetra programme is used. If Demetra is centrally installed on a network, this parameter allows avoiding the conflict between files created or accessed by different users.

Folder Browser to customise the Demetra working directory

Choose the drive and path of the directory from the folder tree. A directory on the local PC should be used.

Path and name of the Demetra log file

Enter the drive, path and name of the log file. A directory on the local PC should be used. That is especially important when you use a server-based installation of Demetra.
Demetra saves the most important processing information into this log file that is opened and shown to the user by default at the execution of the programme. By default, the log file is situated in the first working directory (initialised during the first use).

File Browser to customise the name and location of the Demetra log file

Choose the name, drive and path of the log file from the folder list. A directory on the local PC should be used.

Maximum size of the Demetra log file in bytes

Enter the maximum size of the log file in bytes. It must be a value between 1,000 and 10,000,000 bytes (1 Kb and 10 Mb).
The current size is checked at each new execution of Demetra. If the current size exceeds the

maximum size, the file is truncated at the beginning to the maximum size.
Demetra saves the most important processing information into this log file that is opened and shown to the user by default at the execution of the programme. By default, the log file has a size of 10,000 bytes (10 Kb).

AutoRecover tool

Time interval for AutoRecover savings in minutes

Demetra saves a backup of all currently open Demetra projects after the expiration of a certain time interval that can be customised here. By default, all 30 minutes, a backup is made.
If the system becomes unstable or crashes, Demetra will automatically recover the backup of the projects that were not properly closed at the next new execution.

Other options

Maximum number of time series shown in the Status Table

For projects with very-large-scale datasets (more than 1000 time series), the time to display of the list of series in the Status Table (upper left window in the main view of the Automated Module Project) can be reduced by limiting the number of series listed. On PC's with high performance the default value of 1000 might be most suitable. On less performing computers this value should be decreased.

Time-out for stopping SA methods

Demetra is an interface to the independent seasonal adjustment methods Tramo/Seats and X-12-Arima. The processing of these methods is controlled by Demetra, and if for any reason the seasonal adjustment processing does not finish after the specified time interval, Demetra will stop it. The most suitable time-out depends on the speed of the computer. It should be long enough to allow finishing the processing of very long time or "difficult" time series, but also so short that the user must not wait too long if a real "hang-up" occurs.
The default is 60 seconds.

Use the local settings for the month names

That is a simple option allowing switching between the use of month names in all tables, graphs and reports in local or English language.

Reset to Default Options

Activating this button resets all parameters in this dialog box to the Demetra default settings.

5.2. Stability Analysis and Expert System

Demetra 2.0 provides new tools for an easier and faster modelling of most of the time series that were not easy to adjust using the usual default automatic options.

5.2.1. Optimisation of the number of trading day regressors

When the optimisation of the number of trading day regressors  is switched on, then Demetra compares the diagnostic statistics for the adjustments with stepwise reduced numbers of regressors and choose for the best option for all currently selected time series.

5.2.2. Stability analysis

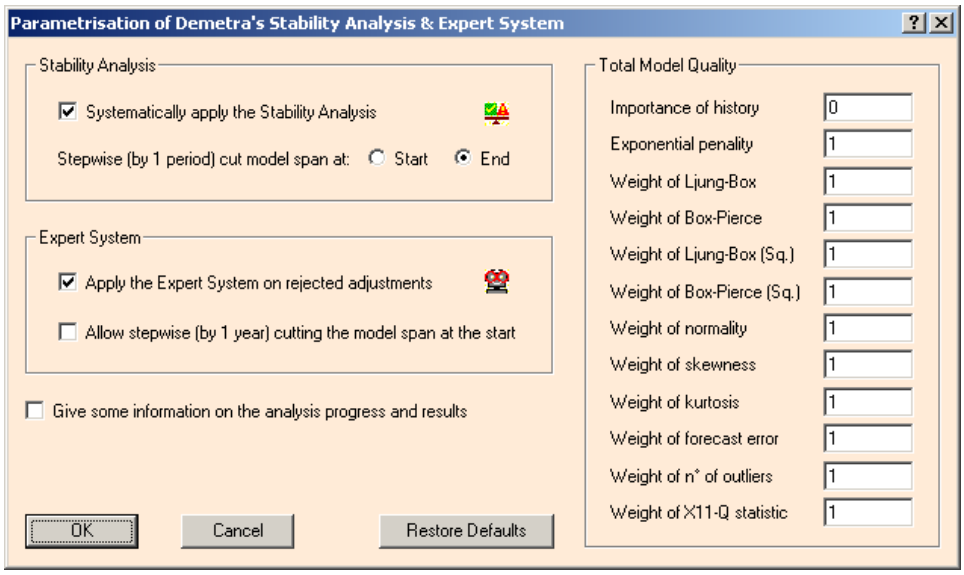
The symbol for this tool is a pair of scales weighting the symbol of an accepted adjustment against a rejected one  . When the Stability Analysis is applied, then for all currently selected time series, Demetra will compare the diagnostic statistics for the adjustments with stepwise (by period) shortened modelling span at the beginning or ending of the time series (during one year), and choose for the best parameterisation.

Demetra is able to use a modelling span also for Tramo/Seats because it runs Tramo a first time on the shortened span with the automatic/customised options and performs a second run with fixed parameters on the complete time series span.

5.2.3. Expert system

The picture with the little robot with glasses  is the symbol for Demetra's seasonal adjustment expert system. This tool works as following:

For all newly rejected adjustments during an adjustment run, Demetra will try to change some of the automatic (!) parameters to obtain an improved modelling, for instance, when the following options were specified:
- Pre-test for the log-transformation (multiplicative modelling): Demetra will compare the range-mean regression slopes for the (currently) linearised series (which is outlier corrected!) and its log-transformed counterpart, and choose the option that corresponds to the smallest slope.
- Pre-test for the correction of trading days and the optimisation (reduction) of the number of trading day regressors was allowed: Demetra will compare the diagnostic statistics for the adjustments with stepwise-reduced numbers of regressors.
- Automatic critical value for the detection/correction of outliers: Demetra will try to optimise this value depending on the number of outliers currently found.
- Automatic identification/selection of the ARIMA model: Demetra will loop through a certain set of combinations of ARIMA model orders.
- If nothing else helped and if specified so in the Expert System options, Demetra will stepwise (year-wise) cut the modelling span at the beginning of the time series down to minimal 4 years, and stop if an acceptable adjustment is found.



Total Model Quality and Criterion for the Stability Analysis

To compare the results for two different models, Demetra has defined a value for the **total model quality**. It is calculated in the following way using all diagnostic statistics that are also applied in the usual Demetra quality check:

$$TotalModelQuality = \sum_j weight_j \cdot \left| \frac{statistic_j - optimalvalue_j}{limitvalue_j - optimalvalue_j} \right|^{penalty}$$

$limitvalue_j$: The limits of the confidence intervals for the concerned test statistics (with highest confidence levels)

$optimalvalue_j$: The optimal values for the concerned test statistics

$statistic_j$: The test statistics obtained from the seasonal adjustment methods

$weight_j$: A weighting factor for each statistic used (see dialog). The default values are 1 and have thus no effect.

$penalty$: The expected values of the absolute terms vary from 0 (optimal value) to infinity (worst value) whereby 1 corresponds to a value of the test statistic that is just on the confidence limit. The penalty term will gradually disadvantage/advantage bad values. The default is 1 and has thus no effect.

The values of the *TotalModelQuality* can also vary from 0 (optimal value) to infinity (worst value). If the value exceeds the number of test statistics used in the check (lets denote it *M*), at least one statistic must have been significant, and thus the adjustment rejected. The *TotalModelQuality* of accepted adjustments is thus smaller than *M*. This value is reported in the log file for each shortened model if the corresponding printing option is set.

For Demetra's Stability Analysis, an additional weighting term punishes too "old" models and gives advantage to models that occurred more often. That is done in the following way:

In the Stability Analysis, the modelling span is stepwise shortened on either end (up to one year of cut values). Shorter the modelling span is more will the model be punished.

- 0 periods cut à *historicweight* = $1+(k \cdot mq)$
- 1 period cut à *historicweight* = $2+(k \cdot mq)$
- ...
- (*mq*-1) periods cut à *historicweight* = $mq+(k \cdot mq)$

The sum of all *historicweight*'s is $(mq+1)\cdot\frac{mq}{2}+k\cdot mq^2$

When a new model (unique ARIMA model orders, mult./add.type, mean correction, trading day correction, Easter correction, and X11 seasonal and trend filters) is found during the run, it is attributed a maximum value of

$$NbrofStats\cdot(mq+1)\cdot\frac{mq}{2}+k\cdot mq^2$$

For each similar model that is found in the run, the term

$$(NbrofStats-TotalModelQuality)\cdot((mq-CutPeriods)+k\cdot mq)$$

is subtracted.

K is the importance of history. Its default value is 0. No additional importance is granted to historical models.

The final value for each type of model is the one used in the choice for the best model in the Stability Analysis. For the best model type the model with the longest modelling span is used.

Algorithms of the Expert System

The systems runs until an acceptable model was found.

- Range-mean regression test

For the linearised series as well as the log-transformed linearised series, Demetra calculates a simple moving average and a moving range (mean distance from moving average) with lengths of one year, for which it receives the correlation coefficients and the test statistic for linear relationships. If the test statistic for the linearised series is higher than the one for the log-transformed linearised series then the multiplicative model is used and vice versa.

If the log-transformation option is different from the regular run then the automatic optimisation of the number of trading day regressors is applied.

- Improvement of VA value

If there are too many outliers, then the critical value for outliers is increased up to the smallest t-value of all outliers and the methods are run again.
If there are not too many outliers then the critical value is decreased to the smallest possible value (Tramo: 2.0, X-12-Arima: 2.8). This step is only done once.

- Improvement of ARIMA model orders

The regular autoregressive and moving average orders p and q are varied from 0 to 3 with the condition that p+q<4. All the other model orders are held fixed at the values of the first regular run. For each ARIMA model type, the procedure for improving the VA value is called.

- Stepwise shortening (by 1 year) of the series

This step is only performed if especially specified by the user. All other algorithms are run again.

Chapter 6 :

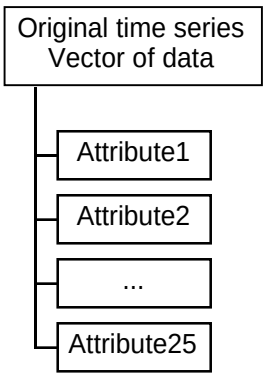
Preparation of input

and interpretation of output

6.1. Format for the storage of parameters in the FAME databases

Structure of Fame

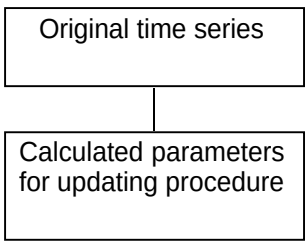
Fame is software especially built for the storage and treatment of time series. Therefore, Fame provides “time series” objects containing a vector for the time series data and 25 attached “attributes” which consist of a simple text string, which has to be named. 5 of the attributes are reserved by the Fame system for the series characteristics like time span and periodicity. The other 20 can be freely used. Once a name is given to one of the free attributes, text can be written and read. The available space in an attribute is large enough to allow the storing of a very long parameter text.



Technical realisation

Demetra uses the structure provided by Fame for the ***storage of the parameter sets***. Using the attributes is the standard way of treating time series characteristics (including user information, data descriptions, options for database treatment etc.). It also simplifies the database management: If the parameters are stored in an attribute of the time series, then erasing of the series would automatically erase the related parameter set.

The original time series and the parameters (calculated and stored in a previous SA procedure and used in the regular updating procedure) are technically needed at the same time as input to the SA methods TRAMO/SEATS or X-12-ARIMA. Thus, the calculated parameters used for the ***regular updating procedure*** in Demetra (statistical tool 1 or 2: SA using the previous model settings) are stored in an attribute of the “time series” object containing the ***original*** time series. This has the additional advantage that a parameter set could already be stored in the attribute of the original time series even if the result time series do not yet exist.



Demetra has defined a default name for the attribute used. It is:

- Demetra_SAIP_ISPO

(Meaning:
SAIP: Seasonal Adjustment Input Parameters
ISPO: Interface Specific Processing Options)

The way the parameters are stored as text into the attribute allows you to perform manual modifications of the parameters directly inside the attributes. Please refer to the page 107 Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output) for more information about the structure of this parameter text.

Example of a filled FAME attribute Demetra_SAIP_ISPO of a time series:

[TRAMO/SEATS
SAIP:SEATS=2,INIC=1,P=0,D=2,Q=1,BP=0,BD=1,BQ=1,
TH(1)=-0.502204260869,JQR(1)=1,BTH(1)=-0.605157773717,JQS(1)=1,INIT=2,
IMEAN=0,ITRAD=2,IEAST=1,INTERP=2,IATIP=1,VA=3.20,INT1=1997.01,
IREG=1,RG(1)=-0.112353516386768,RG(2)=-0.055734530489924,
RG(3)=-0.003498792919832,RG(4)=-0.045770062048928,NOADMISS=1,]
[REG:iuser=2,nser=1,pos(1)=1985.04,type(1)=AO,]
[ISPO:HOST=mypc,DIR=C:\Program Files\Demetra\data\,DB=myoutputdb.db,fa:##myfa,ft:##myft,]

FAME commands to manually display and modify the parameters managed by Demetra

* cd "*C:\Program Files\Demetra\data*"

Changes the directory

* open *mydb.db*

Opens a fame database

* catalog *mydb.db*

Displays the names of all objects contained in the database

* display !string_attribute_names

Displays all attributes of type string used in the database currently opened
After having used Demetra, there should be an entry "Demetra_SAIP_ISPO"

* display Demetra_SAIP_ISPO(*name_of_time_series*)

Displays the contents of the attribute defined by Demetra for the given time series
If the given time series exists and you used Demetra once successful on this time series, you should get an output like this:

Demetra_SAIP_ISPO(*name_of_time_series*)
[TRAMO/SEATS
SAIP:SEATS=2,INIC=1,P=0,D=1,Q=1,BP=0,BD=1,BQ=1,
TH(1)=-0.502204260869,JQR(1)=1,
BTH(1)=-0.605157773717,JQS(1)=1,
INIT=2,IMEAN=0,ITRAD=2,INTERP=2,
IATIP=1,VA=3.20,INT1=1995.12,IREG=5,
RG(1)=-0.112353516386768,RG(2)=-0.082420100950779,
RG(3)=-0.089793743762554,RG(4)=-0.057261937240423,
RG(5)=-0.055734530489924,RG(6)=-0.003498792919832,
RG(7)=-0.004577006204892,NOADMISS=1,]
[REG:iuser=2,nser=5,pos(1)=1985.04,type(1)=AO,
pos(2)=1987.01,type(2)=TC,pos(3)=1995.09,type(3)=TC,
pos(4)=1983.12,type(4)=AO,pos(5)=1992.11,type(5)=LS,]
[ISPO:HOST=myPC,DIR=C:\Program Files\Demetra\data\,
DB=myoutputdb.db,fa:##myfa,ft:##myft,]

Warning: *Please, be careful with the following commands that modify the contents of the database. You can destroy very important information and data structures. Demetra may be unable to find the necessary information.*

* set string_attribute_names={*OTHER_ATTRIBUTE(S)*, Demetra_SAIP_ISPO}

Modifies the list of attributes of type string used in the database currently opened

* attribute Demetra_SAIP_ISPO(*name_of_time_series*)=
"[TRAMO/SEATS
SAIP:*SEATS=2,INIC=1,*
P=0,D=1,Q=1,BP=0,BD=1,BQ=1,
TH(1)=-0.502204260869,JQR(1)=1,
BTH(1)=-0.605157773717,JQS(1)=1,
INIT=2,IMEAN=0,ITRAD=2,INTERP=2,
IATIP=1,VA=3.20,INT1=1995.12,IREG=5,
RG(1)=-0.112353516386768,
RG(2)=-0.082420100950779,
RG(3)=-0.089793743762554,
RG(4)=-0.057261937240423,
RG(5)=-0.055734530489924,
RG(6)=-0.003498792919832,
RG(7)=-0.004577006204892,NOADMISS=1,]
[REG:*iuser=2,nser=5,*
pos(1)=1985.04,type(1)=AO,
pos(2)=1987.01,type(2)=TC,
pos(3)=1995.09,type(3)=TC,
pos(4)=1983.12,type(4)=AO,
pos(5)=1992.11,type(5)=LS,]
[ISPO:*HOST=myPC,*
DIR=C:\Program Files\Demetra\data\,
DB=myoutputdb.db,fa:##myfa,ft:##myft,]"

Updates the contents of the attribute defined by Demetra for the given time series

6.2. Format of the ASCII data files (input and output)

6.2.1. ASCII data files for input

An ASCII data file (*.txt) used for the input to Demetra can contain an unlimited number of time series. A time series is identified by its name. Other characteristics of the data (data periodicity, starting period/year, number of observations) are necessary information for the treatment with the interface and must be given. A set of adjustment parameters specific to a time series can be added.

The format of the ASCII data files was defined using the format of the input files of the original programmes TRAMO/SEATS running in MS-DOS. Adjustment parameters can be added at the end of each time series.

Following formatting rules must be respected:

1. Each time series record contains 7 pieces of information:
- the name of the time series (1 item)
- the number of observations or -1 if Demetra should find it out (1 item)
- the starting year (1 item)
- the starting period (1 item)
- the periodicity (1 item)
- the time series data ([n° of observations] items)
- the seasonal adjustment parameters (1 item)

2. Each item must be separated from the next item. For doing this, an item must be followed by a tab character, a blank (space), a comma or a new line (carriage return/line feed).

3. The first item of each time series (name) must be enclosed by double quotes ("), if it contains several words.

4. The last item of each time series (parameters) must be enclosed by dollar signs ($), since it may also contain several words and figures. If no parameters are defined yet, this item can be empty, but must be indicated by a double dollar sign ($$). The dollar signs mark as well the termination of the time series record.

Name	Name string, e.g. "Product 1"; Must be enclosed by double quotes (**"**), if it contains several words.
N° of observations	Integer, e.g. 60 (or -1 if Demetra should find it out)
Starting year	Integer, e.g. 1988
Starting period	Integer, e.g. 2 for February or for the second quarter
Periods per year	Integer, e.g. 12 for monthly data, 4 for quarterly data
Time series values	Floating point or integer, e.g. 435.25 Missing values before or after the series have to marked with '**#N/A**' or a point '**.**', and inside the series with the value '**-99999.0**'
Parameters	String like '**$[TRAMO/SEATS SAIP: ...] [ISPO: ...]$**' or '**$[X-12-ARIMA SAIP: ...] [ISPO: ...]$**' or '**$$**' containing the adjustment parameters; Must be enclosed by dollar signs (**$**) even if it is empty!

For more information on the format of the adjustment parameters, see page 107 Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output). The best way to learn more about the format required is to leave the parameter item empty ($$) and to perform a new automatic adjustment: The new parameters calculated by the SA-methods can then be found in the output file.

Warning: Do not define the parameters yourself if you are not sure about the meaning or the format. In an extreme situation, this can lead to an instability of the programme.

More information on the format of the output to ASCII can be found here after the following example of an input file.

Example of an input file:

file: "user.txt"

```
"New Prod" -1     1987   1      12     117    153    241    218    202    200    192
    109    154    163    129    89     127    147    247    184    213    204    157
    123    135    166    139    113    153    178    233    215    197    182    155
    107    128    147    114    64     98     115    166    175    173    133    139
    99     123    136    109    88     120    143    193    222    187    183    162
    110    170    191    144    124    $$
"Product 1"       60     1987   1      12     117497 153276 241443 218709 202896
    200064 192762 109974 154109 163650 129863 89690  127367 147950 247927 184599
    213691 204560 157170 123872 135217 166298 139032 113558 153676 178397 233687
    215396 197457 182984 155172 107915 128639 147643 114334 64709  98618  115199
    166369 175057 173856 133181 139844 99098  123147 136589 109528 88284  120652
    143008 193415 222637 187172 183758 162622 110771 170540 191787 144563 124708
    $[TRAMO/SEATS SAIP:SEATS=2,INIC=1,P=0,D=1,Q=1,BP=0,BD=1,BQ=1,
TH(1)=-0.502204260869,JQR(1)=1,BTH(1)=-0.605157773717,JQS(1)=1,
INIT=2,IMEAN=0,ITRAD=2,INTERP=2,IATIP=1,VA=3.20,INT1=1995.12,IREG=5,
RG(1)=-0.112353516386768,RG(2)=-0.082420100950779,
RG(3)=-0.089793743762554,RG(4)=-0.057261937240423,
RG(5)=-0.055734530489924,RG(6)=-0.003498792919832,
RG(7)=-0.004577006204892,NOADMISS=1,]
[REG:iuser=2,nser=5,pos(1)=1985.04,type(1)=AO,pos(2)=1987.01,type(2)=TC,
pos(3)=1995.09,type(3)=TC,pos(4)=1983.12,type(4)=AO,pos(5)=1992.11,type(5)=LS,]
[ISPO:HOST=myPC,DIR=C:\Program
Files\Demetra\data\,DB=output.txt,fa:.myfa,ft:.myft,]$
Product2   60     1987   1      12     155    155    159    159    157    174    160
    -99999 180    170    167    182    187    172    161    130    117    122    120
    123    125    111    106    115    124    126    116    108    112    108    106
    110    110    96     94     96     97     99     94     97     93     107    103
    108    96     99     98     120    125    123    119    104    107    105    105
    108    116    103    110    114    $[X-12-ARIMA
SAIP:X11=1,P=0,D=1,Q=1,BP=0,BD=1,BQ=1,TH(1)=0.506727408623,JQR(1)=1,
BTH(1)=0.659856901527,JQS(1)=1,
INIT=2,ITRAD=2,IEAST=1,INTERP=2,IATIP=1,VA=3.20,INT1=1995.12,IREG=6,
RG(1)=0.000544909077338,RG(2)=-0.056654873500162,
RG(3)=-0.108613487671200,RG(4)=-0.082539867326702,
RG(5)=-0.060991853286927,RG(6)=-0.061293550483082,
RG(7)=-0.077912836810067,RG(8)=-0.003543275026387,
RG(9)=-0.003974049473184,RG(10)=-0.009116495845871,
BIAS=0,SEASONALMA=2,TRENDMA=13,]
[REG:iuser=2,nser=6,pos(1)=1983.12,type(1)=AO,pos(2)=1985.04,type(2)=AO,
pos(3)=1987.01,type(3)=TC,pos(4)=1992.11,type(4)=LS,pos(5)=1994.04,type(5)=TC,
pos(6)=1995.09,type(6)=LS,] [ISPO:HOST=myPC,DIR=C:\Program Files\Demetra\data\,
DB=output.txt,fa:.myfa,ft:.myft,]$
Product3   60     1987   1      12     .      .      443    469    251    286    342
    585    510    535    511    993    1147   977    416    423    384    93     604
    525    436    317    540    923    1079   1747   653    491    368    127    747
    689    438    442    504    1123   1481   1097   453    1065   597    354    591
    891    902    963    874    1072   2100   2349   877    799    945    550    703
    1083   1246   1039   1127   1805   $[X-12-ARIMA SAIP:X11=1,LAM=1,
INIC=-1,INIT=0,SEASONALMA=2,TRENDMA=13,] [ISPO:HOST=myPC,
DIR=C:\Program FIles\Demetra\data\,DB=output.txt,fa:.myfa,ft:.myft,]$
"Product 4"       60     1987   1      12     #N/A   #N/A   403    372    381    465
```

```
    402    535    397    369    322    510    403    416    380    419    404    380
    318    374    318    291    347    443    357    403    320    354    513    414
    320    371    330    256    351    430    317    444    284    316    293    370
    343    343    328    288    296    330    344    417    215    364    331    350
    377    350    318    285    292    388    $$
"Product 5"       60     1987   1      12     .      .      .      .      .
    13224  14404.2       17824  20295  19384  19728  22825  23408  19821  18078
    16488  16958  14808  14884.6       18784  17783  18851  20510  22815  20263
    16718  16795  16865  17163  15600  16248.1       19280  22373  18471  22555
    26737  23442  20542  19363  19976  18639  15004  15734.6       18679  22517
    20713  20775  24909  24267  21625  20213  17515  17847  17362  16452.699
    20014  21908  21639  22774  27326  $[TRAMO/SEATS
SAIP:SEATS=2,LAM=1,INIC=3,IDIF=3,] [ISPO:HOST=myPC,
DIR=C:\Program Files\Demetra\data\,DB=output.txt,fa:.myfa,ft:.myft,]$
```

6.2.2. Output to ASCII data files

After having provided the data to Demetra via an ASCII text file, the output will be written by Demetra to a text file named after the input file plus the extension "_results", or, if the user specified a different ASCII output file, to this one. If the original input file (*filename.txt*) is used for output, it will be backupped into *filename.bak*.

The format of the time series in the output file corresponds exactly to the format required for the input. Thus, all output can be used again as input to Demetra. All items of information on one time series are separated by a tab character. All time series are separated between each other by a new line (carriage return/line feed). Thus, each time series is saved in a separate line. This format allows an easy import of the file and analysis of the data in MS-EXCEL (import option: tab-separated text file).

The original time series are only saved again in the output file if the seasonal adjustment parameters are updated. The new parameters can be found in the parameter item of the ***original*** time series.
Then, all the default result time series or the ones which have been chosen by the user in "Customise the saving of result time series" (Selections for the automatic saving of result time series) will be saved to the text file.

Original and result time series are only saved if a model was accepted - either by the procedure for the automatic detection of rejected adjustments during the Automatic processing of SA-methods (see page 43) or by the user in the procedure for Assisted treatment of rejected adjustments (see page 55). Therefore, results of rejected adjustments or of time series marked with "to be treated with the detailed analysis procedure" are not saved in the output file.

6.3. Format of the MS-EXCEL data files (input and output)

6.3.1. EXCEL data files for input

The number of time series contained in an EXCEL file (*.xls) used for the input to Demetra is only limited by the size (rows/columns) of the EXCEL sheets (16383 (version < 8.0) or 65535 if horizontal formatting, 255 if vertical formatting).
A time series is identified by its name. Other characteristics of the data (data periodicity, starting period/year, and number of observations) are necessary information for the treatment with the interface and are automatically given by respecting the format imposed. A set of adjustment parameters specific to a time series can be added.

The format of the EXCEL files was defined using the usual format of the input files for statistical time series analysis and forecast programmes like FORECAST PRO. Adjustment parameters can be added at the end of each time series.

Following formatting rules must be respected:

The first sheet in the EXCEL file that does not contain the strings "Demetra_Results" or "Demetra_Parameters" in its name, and that has an entry "Vertical" or "Horizontal" in the cell "A1" or a date entry in either of the cells "A2" or "B1", is used for the input to Demetra. A sheet is not used if its cell "A1" contains the text entry "Unused". Only one single sheet per EXCEL file is used for the input.

If the cell "A1" has the entry "Vertical" or the cell "A2" contains a date, then the time series must be given in vertical format:

- one series in one column, the name of the series in the corresponding cell of the first row
- Demetra automatically finds the last time series in the sheet, if the following first column cell (the time series name) is empty
- the first column must contain the corresponding dates (the cells must be date formatted)
- the time series values must correspond to the date column; leave the cells of the time series column empty for dates for which no data is available (before the time series start or after the time series end); fill not available data inside the time series span with "-99999.0", ".", "#N/A" or leave them empty – these values are automatically treated as missing values.
- the row that immediately follows the end of the last date in the date column can be used for the parameters: Demetra or the advanced user may write here for each series in the corresponding column the parameter string like '**[TRAMO/SEATS SAIP: ...] [ISPO: ...]**' or '**[X-12-ARIMA SAIP: ...] [ISPO: ...]**'. The parameter option will only be used if the first cell in this row has the text entry "Parameters". If this parameter item is not set, then the parameters will be read and written from and to a separate sheet in the same EXCEL file called "Demetra_Parameters".

Example of an input file with vertical format:

Example.xls

	A	B	C	D
1	VERTICAL	Seriename1	Seriename2	
2	Jan-85	71.3		
3	Feb-85	77		
4	Mar-85	81.7		
5	Apr-85	72.7	97.9	
6	May-85	82.9	101.5	
7	Jun-85	86.9	101.5	
8	Jul-85	-99999	101.5	
9	Aug-85	-99999.	108.3	
10	Sep-85	#N/A	91.1	
11	Oct-85	.	83.9	
12	Nov-85		104.5	
13	Dec-85	88.9	104.6	
14	Jan-86	74.6	104.9	
15	Feb-86	80	113.7	
128		109.4	86.3	
129	Aug-95	99.4	89.6	
130	Sep-95	115.3	91.5	
131	Oct-95	113.6		
132	Nov-95	119		
133	Dec-95	121.4		
134	PARAMETERS	[TRAMO/SEA	[TRAMO/SEATS SAIP:S	
135				

Remark: With the vertical format a maximum of 255 time series with a maximum length of 600 observations can be treated.

If the cell "A1" has the entry "Horizontal" or the cell "B1" contains a date, then the time series must be given in horizontal format:

- one series in one row, the name of the series in the corresponding cell of the first column
- Demetra automatically finds the last time series in the sheet, if the following first row cell (the time series name) is empty
- the first row must contain the corresponding dates (the cells must be date formatted)
- the time series values must correspond to the date row; leave the cells of the time series row for the dates empty for which no data is available (before the time series start or after the time series end); fill not available data inside the time series span with "-99999.0", ".", "#N/A" or leave them empty – these values are automatically treated as missing values.
- the column that immediately follows the end of the last date in the date column can be used for the parameters: Demetra or the advanced user may write here for each series in the corresponding column the parameter string like '**[TRAMO/SEATS SAIP: ...] [ISPO: ...]**' or '**[X-12-ARIMA SAIP: ...] [ISPO: ...]**'. The parameter option will only be used if the first cell in this column has the text entry "Parameters". If this parameter item is not set, then the parameters will be read and written from and to a separate sheet in the same EXCEL file called "Demetra_Parameters".

Example of an input file with horizontal format:

Example.xls

	A	B	C	D	E	F	G	H	I	J	DY	DZ	EA	EB	EC	ED	EE
1	HORIZONTAL	Jan-85	Feb-85	Mar-85	Apr-85	May-85	Jun-85	Jul-85	Aug-85	Sep-	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	PARAMETERS	
2	Seriename1	71.3	77	81.7	72.7	82.9	86.9	-99999	-99999.	#N/A	99.4	115.3	113.6	119	121.4	[TRAMO/SEATS SAIP:S	
3	Seriename2				97.9	101.5	101.5	101.5	108.3	91.1	89.6	91.5				[TRAMO/SEATS SAIP:S	
4																	

Remark: With the horizontal format a maximum of 65535 (16383 if version < 8.0) time series with a maximum length of 254 observations can be treated.

For more information on the format of the adjustment parameters, see page 107 Definition of the format of Tramo/Seats and X-12-Arima parameters (input and output). The best way to learn more about the format required is to leave the parameter cells empty and to perform a new automatic adjustment: The new parameters calculated by the SA-methods can then be found after the automatic adjustment.

Warning: Do not define the parameters yourself if you are not sure about the meaning or the format. In an extreme situation, this can lead to an instability of the programme.

6.3.2. Output to MS-EXCEL files

After having provided the data to Demetra via an EXCEL text file, the output will be written by Demetra to different sheets named "Demetra_Results_…" in the same file, or, if the user specified a different EXCEL output file, to this one (also in sheets named " Demetra_Results_…"). Result sheets are (vertically/horizontally) formatted like the sheet for the input. One result sheet is used per type of result time series (so one for SA, one for trend, ...). Result time series are written at the position exactly corresponding to the one of the original time series and named with the exact name of the input series. Thus, changes in the structure of the original Excel worksheets can have a critical impact on the processing by Demetra.
Any last written result data of a series is marked in red colour (the rest of the result series is set to black).

You can limit the time span (at the current end of the sheet/series) for which result data will be written by setting cell "A1" of the result sheet to a:
- (EXCEL formatted) date: to save only series data from this date onwards
- positive number #: to save only series data for the last # dates in the date column/row
- negative number -#: to save only series data for the last # years of the date column/row
- text "s" + positive number #: to save only series data for the last # dates of the series
- text "s" + negative number -#: to save only series data for the last # years of the series

New parameter sets are written:
- in the parameter item of the original time series, if the text string "Parameters" is set just after the last date in the date row/column (as it was the case until now), or
- into a separate sheet called "Demetra_Parameters" in the input workbook, if the text string "Parameters" is NOT set just after the last date in the date row/column (the parameters are written at the position exactly corresponding to the one of the original time series).

The default result time series or the ones which have been chosen by the user in "Customise the saving of result time series" will be saved. The result time series are only saved if a model was accepted - either by the procedure for the automatic quality check during the Automatic processing of SA-methods (see page 43) or by the user in the procedure for Assisted treatment of rejected adjustments (see page 55). Therefore, results of rejected adjustments are not saved.

6.4. Definition of the format of TRAMO/SEATS and X-12-ARIMA parameters (input and output)

The way the parameters are stored as text into the FAME attribute, into the MS-EXCEL file or into the ASCII text files (in-between the two dollar signs ($$)) allows you to manually define or modify them. It is mainly based on the format of the parameter specification used in the original DOS programmes of TRAMO/SEATS.

6.4.1. Input of seasonal adjustment parameters

The specification of seasonal adjustment parameters in the namelists "$INPUT **...** $" and "$REG **...** $" for the DOS programmes Tramo/Seats or in the "spec" file for the DOS programme X-12-Arima corresponds in Demetra to the following text structure:

[TRAMO/SEATS SAIP: **...** ,] [REG: **...** ,] [REG: **...** ,] ...

respectively

[X-12-ARIMA SAIP: **...** ,] [REG: **...** ,] [REG: **...** ,] ...

For each original time series, you have to choose between a parameter set for TRAMO/SEATS or for X-12-ARIMA. After the keywords "SAIP:" and "REG:", the parameters settings have to be written in the following form:

TRAMO/SEATS: Use the parameter definitions (for the "namelist" parameters) as described in the user manual of the original DOS programmes. However, you have to replace any observation number by its date (e.g. write "INT1=1980.01" instead of "INT1=1")! The format to specify dates in Demetra is: "yyyy.mm" with a 4-digit year number and a 2-digit period (month/quarter/etc) number.

X-12-ARIMA: The parameter definitions for X-12-Arima are based on these from Tramo/Seats. A complete list of the New formats of the X-12-Arima parameters can be found on page 110.

The keyword "REG:" is used in Demetra (at the moment) only for the specification of fixed outliers, intervention variables and country-specific holidays, and this is mostly done in the same way as the REG namelist in the original DOS programmes TRAMO/SEATS:
- Fixed outliers are entered using "ireg=*n*" (number of regression variables) in the preceding "namelist" parameters and then "iuser=2", "nser=*n*" (number of fixed outliers), and a list of "pos(#)=*yyyy.mm*" (date of outlier) and of "type(#)=*tt*" (type of outlier: AO-additive outlier, LS-level shift, TC-temporary change) in the REG namelist. Replace # by the index of the outlier. This option is also available for the programme X-12-Arima.
- Intervention variables are entered using "ireg=*n*" (number of regression variables) in the preceding "namelist" parameters and then "iuser=0", "iseq=*n*" (number of intervention variables), and a list of "start(#)=*yyyy.mm*" (starting date) and of "len(#)=*n*" (length of the intervention variable) in the REG namelist. Replace # by the index of the intervention variable. Additionally, the variables "regeff", "delta" and "deltas" can be used. (Only for TRAMO/SEATS!)
- Country-specific holidays to adjust the trading day regression variables can be specified for Tramo/Seats using "ireghld=1" in the preceding "namelist" parameters and then "iuser=-3", "nhldy=*n*" (number of holidays specified), and a list of "hld(#)=?" in the REG namelist. Replace # by the index of the holiday. You have to distinguish among 4 different types of holidays:

1. Movable holidays (these are movable religious feasts that are yearly repeated):
   replace ? by **AshWed** to specify: Ash Wednesday
   replace ? by **MauThu** to specify: Maundy Thursday (Easter Thursday)
   replace ? by **GooFri** to specify: Good Friday (Easter Friday)
   replace ? by **EasMon** to specify: Easter Monday
   replace ? by **PraFri** to specify: Common Prayer Day (Friday)
   replace ? by **AscThu** to specify: Ascension Day (Thursday)
   replace ? by **WhiMon** to specify: Whit Monday (Pentecost Monday)
   replace ? by **CorThu** to specify: Corpus Christi (Thursday)
   replace ? by **OLeMon** to specify: Orthodox Calendar - Start of Lent (Clean Monday)
   replace ? by **OGoFri** to specify: Orthodox Calendar - Good Friday (Easter Friday)
   replace ? by **OEaMon** to specify: Orthodox Calendar - Easter Monday
   replace ? by **OEaTue** to specify: Orthodox Calendar - Easter Tuesday
   replace ? by **OGhMon** to specify: Orthodox Calendar - Holy Ghost (Pentecost Monday)
2. Fixed holidays (these are holidays on fixed dates that are yearly repeated):
   replace ? by **dd-mmm** like 01-Jan to specify: 1st of January (New Years Day), use 01 to 31 for the day and Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov or Dec for the month.
3. Fixed weekdays (these are holidays on fixed days of the week that are yearly repeated):
   replace ? by **wwwmmm** like MonMay to specify: every last Monday in May (US Memorial Day), use Mon,Tue,Wed,Thu,Fri or Sat for the weekday, and Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov or Dec for the month.
4. Fixed single dates (these are holidays that occur(ed) only once):
   replace ? by **dd-mmm-yyyy** like 02-Jan-1998 to specify: 2nd of January 1998 (e.g. special holiday for the death of the president), use 01 to 31 for the day, Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov or Dec for the month and 1901 to 2099 for the year. Further use this specification to indicate holidays that are not covered by the 3 other types of holidays (e.g. US Inauguration Day: 20th January of each fourth year after 1965, or holidays that are celebrated on the next succeeding working day if it falls on a Sunday)

Example for fixed outliers:
...,ireg=3,] [REG:*iuser=2,nser=3,*
pos(1)=1985.04,type(1)=AO,
pos(2)=1987.01,type(2)=TC,
pos(3)=1995.09,type(3)=TC,]
Example for intervention variables:
...,ireg=1,] [REG:*iuser=0,iseq=1,regeff=3,delta=0,start(1)=1982.01,len(1)=1,*]
Example for country-specific holidays:
...,ireghld=1,] [REG:*iuser=-3,*nhldy=4,*regeff=3,*hld(1)=EasMon,hld(2)=01-Jan,hld(3)=MonMay,hld(4)=02-Jan-1998,]

*Note: If fixed outliers are specified, they must all be given together using one single REG keyword with "iuser=2". This REG keyword must be the **last** of all REG keywords entered for one time series!*

6.4.2. Input of processing options

After the entries for the seasonal adjustment parameters ([TRAMO/SEATS SAIP: **...** ,] [REG: **...** ,] [REG: **...** ,] ...) a text structure for the definition of the result time series to produce and store is added using:

[ISPO: **...** ,]

The variables to be entered after the keyword "ISPO:" are:
HOST=..., name of the remote machine or local PC where the output database/data file is located (database/data used for the storage of the result time series)
DIR=..., name of the directory where the output database/data file is located
DB=..., name of the output database/data file
'time_series_abbreviation':..., list of result time series to be stored together with their (default or customised) names (obligatory!)

The following *abbreviations* must be used to define which result time series should be produced and stored.

Result time series	*Abbreviation*
Final Components	
Final Seasonally Adjusted Series	fa
Final Trend	ft
Final Seasonal Factors/Component	fs
Final Irregular Factors/Component	fi
Final Transitory Factors/Component	fc
Business Cycle (from Hodrick-Prescott filter)	b
Final Long-Term Trend (from Hodrick-Prescott filter)	fl
Business Cycle (from H-P filter) + Irregular	bi
Forecasted Final Components	
Forecasted Final Seasonally Adjusted Series	ft_f
Forecasted Final Trend	ft_f
Forecasted Final Cyclical Factors (Comp.)	fc_f
Forecasted Final Seasonal Factors (Comp.)	fs_f
Forecasted Final Irregular Factors (Comp.)	fi_f
Fcstd. Business Cycle (from Hodrick-Prescott filter)	b_f
Fcstd. Final Long-Term Trend (from Hodrick-Prescott filter)	fl_f
Fcstd. Business Cycle (from H-P filter) + Irregular	bi_f
Forecasted Original Uncorrected Series	o_f
Preliminary Result Series	
Seasonally Adjusted Series	a
Trend	t
Cyclical Factors (Component)	c
Seasonal Factors (Component)	s
Irregular Factors (Component)	i
Linearised series	l
Residuals	res
Interp. Series Corr. for Calendar Effects	omce
Standard Error of Seasonally Adjusted Series	sea
Standard Error of Trend	set
Standard Error of Seasonal Factors/Component	ses
Standard Error of Transitory Factors/Component	sec
Forecasted Preliminary Result Series	
Forecasted Seasonally Adjusted Series	a_f
Forecasted Trend	t_f
Forecasted Cyclical Factors (Component)	c_f
Forecasted Seasonal Factors (Component)	s_f
Pre-adjustment Factors (or Components)	
Aggregate Pre-Adjustment Factors (Component)	p
Aggregate Outlier Effects	po
Transitory Changes	ptc
Level Shifts	pls
Aggregate Trading Day Effects	pt
Easter Effect	pse
Non-Alloc. User-Regr. Effects (Sep. Comp.)	pun
User-Regr. Effects Allocated to Seas. Comp.	pus
User-Regr. Effects Allocated to Trend	put
User-Regr. Effects Allocated to Irreg. Comp.	pui
User-Regr. Effects Allocated to Seas. Adj. S.	pua
User-Regr. Effects Allocated to Cycle	puc
Forecasted Pre-Adjustment Factors (or Components)	
Forecasted Aggregate Pre-Adj. Factors (Comp.)	p_f
Forecasted Aggregate Outlier Effects	po
Forecasted Transitory Changes	ptc_f
Forecasted Level Shifts	pls_f
Forecasted Aggregate Trading Day Effects	pt_f
Forecasted Easter Effect	pse_f
Fcstd. Non-Alloc. User-Regr. Effects (Sep. Comp.)	pun_f
Fcstd. User-Regr. Effects Alloc. to Seas. Comp.	pus_f
Fcstd. User-Regr. Effects Alloc. to Trend	put_f
Fcstd. User-Regr. Effects Alloc. to Irreg. Comp.	pui_f
Fcstd. User-Regr. Effects Alloc. to Seas. Adj. S.	pua_f
Fcstd. User-Regr. Effects Alloc. to Cycle	puc_f

After the abbreviations, you have to precise a (default or customised) name which will be used for the storing of the result time series. You can do this using the procedure Selection of result time series. By default, the names of the result time series (e.g. final trend, final SA series) are created by ***adding a specific suffix*** to the name of the original time series. The default suffix corresponds to the above given abbreviations.
You can also ***replace the suffix*** of your original series by a customised suffix of the result series. This can be done in the following way: When you enter a user-defined suffix for a result time series, start this suffix with as many "#"-characters as the suffix of the original series is long. Each "#"-character deletes a letter from the end of the name of the original series. Add then the new suffix for the result time series.

Example:
- name of the original series: "MYSERIES.ORIG", default suffix of trend series: ".ft", resulting name of the trend series: "MYSERIES.ORIG.ft"
- name of the original series: "MYSERIES.ORIG", user-defined suffix of trend series: "####TREND", resulting name of the trend series: "MYSERIES.TREND"

Example of a complete parameter specification for a time series

"[TRAMO/SEATS
SAIP:*SEATS=2,INIC=1,P=0,D=1,Q=1,BP=0,BD=1,BQ=1,*
TH(1)=-0.502204260869,JQR(1)=1,BTH(1)=-0.605157773717,JQS(1)=1,
INIT=2,IMEAN=0,ITRAD=2,INTERP=2,IATIP=1,VA=3.20,INT1=1995.12,IREG=5,
RG(1)=-0.112353516386768,RG(2)=-0.082420100950779,
RG(3)=-0.089793743762554,RG(4)=-0.057261937240423,
RG(5)=-0.055734530489924,RG(6)=-0.003498792919832,
RG(7)=-0.004577006204892,NOADMISS=1,]
[REG:*iuser=2,nser=5,*
pos(1)=1985.04,type(1)=AO,pos(2)=1987.01,type(2)=TC,
pos(3)=1995.09,type(3)=TC,pos(4)=1983.12,type(4)=AO,
pos(5)=1992.11,type(5)=LS,]
[ISPO:*HOST=myPC,DIR=C:\Program Files\Demetra\data\,DB=myoutputdb.db,fa:##myfa,ft:##myft*,]"

6.4.3. Demetra's formats of the X-12-Arima parameters

The following table shows the format of the X-12-Arima parameters as they have to be given in the FAME attribute, in the parameter cells of the MS-EXCEL sheet or in the $$ mark of the ASCII input file, if you want to set them yourself. The left column contains the original arguments used in the X-12-Arima spec files as they are documented in the user manual of the original DOS programme. The second column contains all the possible modalities of the arguments and the right column contains the format to be used for the input of the corresponding parameters to Demetra.

X-12-Arima SPEC	***Modalities*** *(default value in **bold**)*	***Format in Demetra***
series{}		*always called by Demetra*
period	***12*** *| 4*	*MQ={1 | ... } but controlled by Demetra*
comptype	*add | sub | mult | div { default: **no aggregation** }*	*not yet possible*
compwt	*any number > 0 { default: **1D0** }*	*not yet possible*

modelspan	*(startdate, enddate) { default:* ***starting, ending date of span*** *}*	*only for detailed analysis*
spectrumstart	*date { default:* ***eight years before end of span for monthly series, start of span for quarterly series*** *}*	*only for detailed analysis*
print		*controlled by Demetra*
save		*controlled by Demetra*
savelog		*controlled by Demetra*
# spectrumtype	***arspec*** *| periodogram*	*only for detailed analysis*
# diffspectrum	***yes*** *| no*	*only for detailed analysis*
# saveprecision	*integer from 1 to* ***15***	*controlled by Demetra*
composite{}		*not yet possible*
transform{}		*always called by Demetra*
function	*none |* ***log*** *| sqrt | inverse | logistic | auto { !!!: x12-default: none }*	*LAM={ 1 |* ***0*** *| 2 | 3 | 4 | -1 }*
power	*power for Box-Cox power transformation { default:* ***no transformation*** *}*	*LAM={ 5 }* *POWER={* ***0.0*** *}*
adjust	*lom | loq | lpyear |* ***none***	*ADJUST={ 2 | 3 | 4 |* ***1*** *}*
type	*temporary | permanent*	*not yet possible* *TMPADJFAC {* ***0*** *| 1 }* *PRMADJFAC {* ***0*** *| 1 }*
data	*( )*	*not yet possible* *TMPADJFACLOC={ ' ' }* *TMPADJFACSERIES={ ' ' }* *TMPADJFACNOBS={ 0 }* *PRMADJFACLOC={ ' ' }* *PRMADJFACSERIES={ ' ' }* *PRMADJFACNOBS{ 0 }*
start	*date { default:* ***beginning of the series*** *}*	*not yet possible* *TMPADJFACSTART={ 0000.00 }* *PRMADJFACSTART={ 0000.00 }*
title	*' '*	*not yet possible* *ADJFACTITLE={ ' ' }*
file	*' '*	*input with argument data*

format	*'(valid FORTRAN format)' | '1r' | '2r' | '1l' | '2l' | 'cs' | 'datevalue' | 'x12save' | 'tramo'*	*input with argument data*
name	*'**TempAdj**','**PermAdj**'*	*not yet possible* *TMPADJFACNAME={ '**TempAdj**' }* *PRMADJFACNAME={ '**PermAdj**' }*
precision	*0 { number of input decimals, must be an integer from 0 to 5, inclusive }*	*input with argument data*
mode	***percent*** *| ratio | diff ,* ***percent*** *| ratio | diff*	*ADJFACMODE(1,2)={* ***0*** *| 1 | 2 }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*
# aicdiff	*number > 0 { default:* ***2.0*** *}*	*TRAICDIFF={* ***2.0*** *}*
x11{}		*X11={* ***1*** *| 0 },* *only called if X11 = 1*
mode	***mult*** *| add | logadd | pseudoadd*	*LAM={* ***0*** *| 1 | 0 | 0 | -1 }* *MODE={* ***0*** *| 0 | 2 | 1 | 0}*
sigmalim	*(**1.5 2.5**) | (lower and upper sigma limits, both > 0)*	*SIGMALIML={* ***1.5*** *}* *SIGMALIMU={* ***2.5*** *}*
seasonalma	*x11default | s3x1 | s3x3 | s3x5 | s3x9 | s3x15 | stable |* ***msr***	*SEASONALMA={ 7 | 0 | 1 | 2 | 3 | 4 | 5 |* ***6*** *} or* *SEASONALMA(1,…,MQ)={ 7 | 0 | 1 | 2 | 3 | 4 | 5 |* ***6*** *}*
trendma	*any odd number greater than 1 and less than or equal to 101 { default: automatic trend selection }*	*TRENDMA={3 | … | 101 |* ***0*** *}*
title	*'of seasonal adjustment'*	*controlled by Demetra*
appendfcst	*yes |* ***no***	*controlled by Demetra*
x11easter	*yes |* ***no***	*X11EASTER={ 1 |* ***0*** *}*
force	*totals | round | both | { default:* ***seasonally adjusted series unchanged*** *}*	*BIAS={ -1,…,-MQ | -13 | -14,…,-2*MQ-1 |* ***0*** *}*
# forcestart	*month or quarter when forcing starts { default: 1st month or quarter of year }*	*BIAS={ 0 | -1 or –14 | … | -MQ or –MQ-13 }*
type	***sa*** *| summary | trend*	*TYPE={* ***0*** *| 1 | 2 }*

final	*ao* *ls* *tc* *user* *{ default:* ***all listed effects kept in final seasonally adjusted series*** *}*	*ADJFINALAO={* ***0*** *| 1 }* *ADJFINALLS={* ***0*** *| 1 }* *ADJFINALTC={* ***0*** *| 1 }* *ADJFINALUSR={* ***0*** *| 1 }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*
# keepholiday	*yes |* ***no***	*ADJFINALHLDY={ 0 |* ***1*** *}*
# calendarsigma	*all | signif | select |* ***none***	*CALENDARSIGMA={ 3 | 2 | 4 |* ***1*** *}*
# sigmavec	*list of months to be grouped together*	*SIGMAVEC(1,...,MQ)={* ***0*** *| 1 }*
# itrendma	***centered1yr*** *| cholette2yr*	*ITRENDMA={* ***0*** *| 1 }*
# taper	*number between 0 and* ***1***	*TAPER={* ***1*** *}*
# trendic	*any real >* ***0*** *{ default : depends on what is entered for trendma }*	*TRENDIC={ ... }*
# sfshort	*yes |* ***no***	*SFSHORT={ 1 |* ***0*** *}*
# print1stpass	*yes |* ***no***	*only for detailed analysis*
# spectrumaxis	***yes*** *| no*	*only for detailed analysis*
x11regression{}		*not supported with Demetra*
identify{}		*only for detailed analysis*
regression{}		*always called by Demetra*

variables	*[**none**] | const* *[**none**] | seasonal | sincos[1 to period/2]* *[**none**] | tdnolpyear | td1nolpyear | tdnolpyear lpyear/lom/loq | td1nolpyear lpyear/lom/loq | td | td1coef | tdstock[n]* *[**none**] | lpyear | loq | lom* *[**none**] | easter[1 to 25] | sceaster[1 to 25])* *[**none**] | labor[1 to 25]* *[**none**] | thank[-8 to 17]* *[**none**] | aodate* *[**none**] | lsdate* *[**none**] | tcdate* *[**none**] | rpdate-date* *change-of-regime date for tdnolpyear, td, tdstock[n]:* *[**none**] | '/1992.06//' | '//1992.06/' | '/1992.06/'* *change-of-regime date for lpyear, lom, loq:* *[**none**] | '/1992.06//' | '//1992.06/' | '/1992.06/'* *change-of-regime date for seasonal, sincos[1 to period/2]:* *[**none**] | '/1992.06//' | '//1992.06/' | '/1992.06/'*	*IMEAN={ **0** | 1 }* *FSE={ **0** | 1 | -1 }* *FSEFREQ(1,...,mq/2)={ **0** | 1 }* *ITRAD={ **0** | 6 | 1 | 7 | 2 | 15 | 10 | 0 }, TDSTOCK={ **0** | 0 | ... | 1 to 31 }, ADJUST={ **.** | . | . | 1 | 1 | 1 | 1 | . }, TDINEX={ **0** }* *ITRAD={ **0** | 9 | 9 | 9 }, LOM={ **0** | 0 | 1 | 1 }, MQ={ **.** | . | 12 | 4 }* *IEAST={ **0** | 1 | 2 }, IDUR={ 1 ,..., **6** ,..., 25 }, EASTINEX={ **0** }* *LABOR={ **0** | 1 }, LABORDUR={ 1 ,..., **5** ,..., 25 }* *THANK={ **0** | 1 }, THANKDUR={ 1 ,..., **5** ,..., 25 }* *IREG={ **0** | 1 | … },* *[REG: iuser=2, nser={ 1 | 2 | ... }, pos(1,2,...,nser)={ yyyy.mm }, type(1,2,...,nser)={ AO | LS | TC },...]* *INTD1={ yyyy.mm }, TDCHG={ **0** | 1 | -1 | 0 }* *INTLOM={ yyyy.mm }, LOMCHG={ **0** | 1 | -1 | 0 }* *INTFSE={ yyyy.mm }, FSECHG={ **0** | 1 | -1 | 0 }*
user	*(names of user-defined regression variable(s))*	*not yet possible*
data	*( )*	*not yet possible*
start	*date { default: the begining of the series }*	*not yet possible*
file	*' '*	*input with argument data*
format	*'(valid FORTRAN format)' | 'datevalue' | 'x12save'*	*input with argument data*
aictest	*[**none**] | td | tdnolpyear | td1coef | td1nolpyear | tdstock* *Same variable **in** | not in 'variables' argument* *[**none**] | easter* *Same variable **in** | not in 'variables' argument* *[**none**] | user*	*ITRAD={ **0** | -15 | -6 or -7 | -10 | -1 or -2 | 0 }, TDSTOCK={ **0** | 0 | ... | -1 to -31 }* *TDINEX={ **0** | 1 }* *IEAST={ **0** | -1 }* *EASTINEX={ **0** | 1 }* *not yet possible*

usertype	*(constant seasonal td lpyear lom loq tdstock easter sceaster thanks labor holiday ao ls rp tc user)*	*not yet possible*
augmentusertd	***yes*** *| no*	*AUGMENTUSERTD={ **1** | 0 }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*
# noapply	*[**none**] | td* *[**none**] | ao* *[**none**] | ls* *[**none**] | tc* *[**none**] | holiday* *[**none**] | userseasonal* *[**none**] | user*	*NOAPPLYTD={ **1** | -1 }* *NOAPPLYAO={ **1** | -1 }* *NOAPPLYLS={ **1** | -1 }* *NOAPPLYTC={ **1** | -1 }* *NOAPPLYHOL={ **1** | -1 }* *NOAPPLYSEA={ **1** | -1 }* *NOAPPLYUSR={ **1** | -1 }*
# tcrate	*number between 0 and 1 { if DNOTST default: **0.70 * (12/period)** }*	*DELTATC={ … }*
# aicdiff	*positive real { default: **0.0** }*	*REGAICDIFF={ **0.0** }*
# b	*(initial coefficients for regressors, or fixed coefficients with suffix f, e.g. -.6f)* *{ default value for coefficients: **0.1 not fixed** }*	*RG(1, ..., n° of regressors)={ **0.1** }* *fixing of single coefficients:* *RGFIX(1, ..., n° of regressors)={ **0** | 1 }* *Estimation of unknown coefficients and starting values by X-12-Arima | estimation of unknown coefficients with starting values input by user | all coefficients fixed:* *INIT={ **0** | 1 | 2 }*
arima{}		*INIC={ **0** | 3 }* *IDIF={ **0** | 3 }* *only called if INIC = 0 and IDIF = 0*
model	*(p d q)(P D Q)* *{ default: (**0 1 1**)(**0 1 1**) }*	*P={ **0** | 1 | 2 | 3 | 4 }* *D={ 0 | **1** | 2 | 3 }* *Q={ 0 | **1** | 2 | 3 | 4 }* *BP={ **0** | 1 | 2 }* *BD={ 0 | **1** | 2 | 3 }* *BQ={ 0 | **1** | 2 }*

ar *ma* *[diff]*	*(initial coefficients for AR, MA and DIFF or fixed coefficients with suffix f, e.g. -.6f)* *{ default value for coefficients: **0.1 not fixed** }*	*PHI(1, ..., P)={ **0.1** },* *BPHI(1, ..., BP)={ **0.1** },* *TH(1, ..., Q)={ **0.1** },* *BTH(1, ..., BQ)={ **0.1** }* *fixing of single coefficients:* *JPR(1, ..., P)={ **0** | 1 },* *JPS(1, ..., BP)={ **0** | 1 },* *JQR(1, ..., Q)={ **0** | 1 },* *JQS(1, ..., BQ)={ **0** | 1 },* *Estimation of unknown coefficients and starting values by X-12-Arima | estimation of unknown coefficients with starting values input by user | all coefficients fixed:* *INIT={ **0** | 1 | 2 }*
title	*' '*	*controlled by Demetra*
automdl{}		*INIC={ **0** | 3 }* *IDIF={ **0** | 3 }* *only called if INIC = 3 and IDIF = 3*
mode	*both | **fcst***	*AUTOMDL={ 2 | **1** }*
method	*first | **best** { modified default! }*	*IFAL={ 1 | **0**]*
file	*' ' { default: '**x12a.mdl**' }*	*MDLFILE={ "**x12a.mdl**" }*
qlim	*any number > 0 and < 100 { default: **5.0** }*	*PCR={ **0.95** }*
fcstlim	*any number > 0 { default: **15.0** }*	*FCSTLIM={ **15.0** }*
bcstlim	*any number > 0 { default: **18.0** }*	*BCSTLIM={ **18.0** }*
overdiff	*any number > 0 { default: **0.9** }*	*XL={ **0.9** }*
identify	*all | **first***	*IDENTIFY={ 0 | **1** }*
outofsample	*yes | **no***	*AMSOUTOFSAMPLE={ 1 | **0** }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*
estimate{}		*always called by Demetra*
maxiter	*maximum number of iterations { default: **200** }*	*MAXIT={ **200** }*
tol	*convergence tolerance { default: **10e-5** }*	*TOL={ **10e-5** }*

parms	*fixed* | ***estimated***	*controlled by Demetra using INIT = { 2 | 0 or 1 }*
exact	*ma* | ***arma*** | *none*	*EXACT={ 0 | **1** | -1 }*
outofsample	*yes* | ***no***	*DGNOUTOFSAMPLE={ 1 | **0** }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*
# file	*' '*	*input with other arguments*
# fix	***nochange*** | *all* | *arima* | *reg* | *none*	*input with other arguments*
outlier{}		*IATIP={ **0** | 1 }* *only called if IATIP = 1*
types	*none* | *ao* | *ls* | *tc* | ***ao ls*** | *ao tc* | *ls tc* | *ao ls tc (or: all)*	*AIO={ 0 | 4 | 5 | 6 | 3 | 1 | 7 | **2** }*
method	***addone*** | *addall*	*IMVX={ **1** | 0 }*
critical	*critical value for outlier testing | (criticalAO , criticalLS , criticalTC) { default: depends on length of span, see Table 3 }*	*VA={ … }* *VA2={ … }* *VA3={ … }*
span	*(startdate, enddate)*	*INT1={ yyyy.mm }* *INT2={ yyyy.mm }*
lsrun	*number of successive level shifts to test { default: **0** }*	*LSRUN={ **0** | 1 | ... }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
# tcrate	*number between 0 and 1 { default: **DNOTST)**, changed to 0.70 * (12 / period) }*	*DELTATC={ … }*
check{}		*CHECK = { **0** | 1 }* *only called if CHECK = 1*
maxlag	*number of acf's to print { default: **3*Sp** }*	*maximum of M={ **3*MQ** | ... } and IQM={ 8 | ... | 24 }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
savelog	*See Table 2 for list of diagnostics*	*controlled by Demetra*

forecast{}		*always called by Demetra*
maxlead	*how many forecasts { default:* ***NOTSET*** *resp.* ***Sp*** *}*	*NPRED={ 0 | 1 | ... }*
maxback	*how many backcasts { default:* ***NOTSET*** *}*	*MAXBACK={ 0 | 1 | ... }*
probability	*coverage probability of prediction intervals, assuming normality { default:* ***0.95*** *}*	*PROBA={* ***0.95*** *}*
exclude	*number of observations to drop before starting forecasts { default:* ***0*** *}*	*NBACK={* ***0*** *| 1 | ... }, SEATS={ . | 0 | ... }*
print	*See Table 1 for list of table names*	*controlled by Demetra*
save	*See Table 1 for list of table names*	*controlled by Demetra*
slidingspans{}		*only for detailed analysis*
history{}		*only for detailed analysis*

Index