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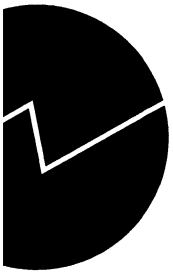

Statistics Norway
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Documents

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The Implementation Model

Technical Documentation of
Computer Programs and Procedures

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Technical Documentation of Computer Programs and Procedures

Abstract:
This document gives a detailed description of the computer programs and procedures developed to operate the Implementation Model, a short-to-medium term, demand oriented, macroeconomic model for Saudi Arabia. The model has been developed by the Research Department of Statistics Norway for the Ministry of Planning in Saudi Arabia, as part of a United Nations Department for Development Support and Management Service (UN/DDSMS) project, and is intended to be used in connection with the preparation and monitoring of the five-year Development Plans. The assignment has been an integral part of the UN/DDSMS Project SAU/94/001/A/01/01 Support for Economic Planning, Modelling and Management Information Systems Development under the contract TCD CON 4/95 with Statistics Norway. The Project is intended to assist the Government of Saudi Arabia in designing and implementing an interlinked system of macroeconomic models and will also support the development of an integrated information system in the Ministry of Planning directed at assisting the model development exercise and attaining closer co-ordination of plan formulation and execution processes. Portable TROLL, a PC-based modelling and simulation system developed by Intex Solutions, Inc., has been used for the development and operating of the model. This document describes the organization of directories and the file structure of the computer programs used to operate the model, including a complete presentation of the programs controlling input and output. A description of the routines to generate the data base as well as a presentation of the model itself in full detail is also included. Finally, the document presents the programs and procedures made to organize simulations

Keywords: Saudi Arabia, macroeconomic model, macroeconomic planning

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1. Introduction[1]

This document describes the model system and presents the computer programs made to operate the Implementation Model developed by the Research Department of Statistics Norway, for the Ministry of Planning, Saudi Arabia, as part of a United Nations project. Its purpose is to serve as a detailed documentation of the system specific computer programs, and thereby as a reference work for those operating the model.

The Implementation Model may be characterized as a short-to-medium term demand oriented macroeconomic model, built over an input-output framework. The model specifies 17 production sectors (including imports). Its behavioural relationships are centred on the private non-oil sector, reflecting economic consequences of fiscal or monetary policy actions taken by the government in pursuance of plan targets. The model will also take into consideration impulses from the oil sector and from abroad.

The model itself, as well as the procedures used to handle the different tasks related to it, is programmed in the Portable TROLL modelling and programming language, and is run on a personal computer under a Windows environment. The TROLL system is particularly useful when it comes to simulation of simultaneous equations, but also provides useful routines for updating data bases and models and for estimation tasks. This document will focus in detail on the programs made specially for the Implementation Model. Among them are the routines for controlling input and output as well as programs used when forecasting and simulating.

The document is organized as follows: Chapter 2 gives a description of the directories and the file structure used in operating the model. Chapter 3 will present the files that organize the input to TROLL from external files (time series, coefficients, models, programs, etc.), and the files that direct output to prespecified files or data bases (extrapolation and simulation results, estimated coefficients, etc.). In chapter 4 we describe how to generate the data to be used in the model into the TROLL data base. This chapter will also present, in full details, the program files made for this purpose. Chapter 5 presents the equations in the models and describes the sub-models role in the system. Chapter 6 presents the input file containing the input-output coefficients in the model. In chapter 7 programs used for extrapolation and simulation are presented.

In general we have tried to give ample comments inside the source files for the different programs. Because of this we have chosen to present almost all these source files exactly, as they have been written for TROLL, in this document. A /* (slash followed by a multiplication operator) at the beginning of a line indicates that the line contains a comment, and will not be processed by TROLL. Note that several of the chapters headings are, in fact, file names.

2. Directories and file structure

This chapter gives an overview of the files and directories created to operate the Implementation Model in a proper way. TROLL is very flexible when it comes to decide where to get input and where to direct output. The organization of the system around the model, data bases, programs etc., is to a large extent limited by the model user, and not by technical restrictions. This chapter first describes the directories and their content, before the different files attached to the model are explained.

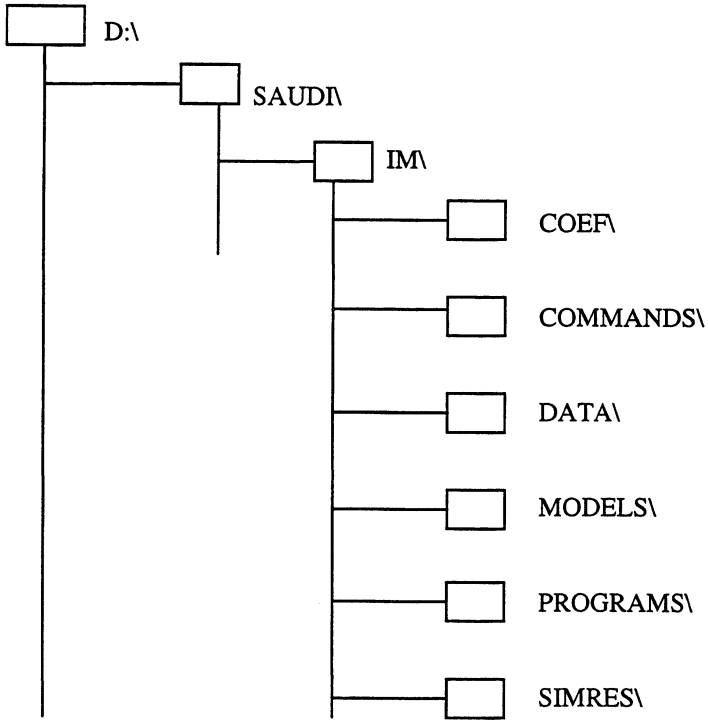
---

[1]We owe special thanks to Einar Bowitz, Statistics Norway, whose assistance has been crucial in the development of the model system. Many programs made for the Implementation Model are modified versions of programs originally developed by him, Nils. Ø. Mæhle and Rune Johansen, also Statistics Norway, see Bowitz et al. (1995).

2.1. Directories

If nothing else has been specified, TROLL will read input to the model from the TROLL directory, and save output, for instance estimation and simulation results, to the same location. This directory already contains originally designed programs and macros. If we, in addition to them, shall store time series, coefficients, models, simulation results, etc. at the same directory, it will be almost impossible to keep it organized. Due to this we have chosen to keep the model system apart from the TROLL directory.

Figure 1. Directory structure for the Implementation Model



The organization of directories is shown in Figure 1. As can be seen, the directories are held apart from the TROLL directory (not shown here). The D:\TROLL directory contains original TROLL commands, macros and program files which we don't want to mix with our specially designed programs. This requires some kind of link between the directories made for the Implementation Model and the TROLL system files. This link is made by running the access and search files. All the programs developed by us, except of the access and search files, are located in the sub-directories on D:\SAUDI\IM. The access and search files are located at the D:\TROLL directory[2].

Figure 1 shows the different directories created to organize the different dataobjects in connection with the model system. SAUDI is a main directory where the Implementation Model, together with the other model system developed (not shown here), are located. The IM directory itself consist of six sub-directories. The first one, COEF, contains the estimated regression coefficients, which are stored inside a formdata file. This means that all coefficients estimated are stored inside the only file located at this directory. The coefficients are mainly estimated inside TROLL. The COMMANDS directory consist, amongst others, of the text files used to generate the historical time series and the models. These text files contains commands which, when executed by TROLL, establishes the data base and

[2] This name of the root directory (D) is, of course, special for our machines, but it should be noticed that some of the programs are dependent of this name. This means that if these programs are transfered to a machine with another name of the root directory, the programs must be changed.

the model in TROLL format, located at the MODELS and DATA directories respectively. The historical time series are, as the coefficients, saved in a formdata file while the model is saved as an ordinary disk file. The PROGRAMS directory contains the model specific programs and macros made to operate the Implementation Model. It should be noticed that this directory contains both the compiled and uncompiled versions of the programs and macros. The SIMRES directory, is meant to be used for simulation output. The files on this directory will also be of formdata type.

The extensions following the file names tells what kind of «datatype» the data object is, and plays an important role in controlling input and output. For instance, we have three data objects which are classified as datatype «data» in three different sub-directories. These are the formdata files for the estimated coefficients, the historical time series and the simulation (and extrapolation) output. This means that we, in some way, have to distinguish between the output from the three tasks (so that we don't mix them together in the same file). We have solved this by using three different search files to direct the output. One search file is used when updating (or reinstalling) the historical time series, to ensure that the new time series data are stored at the DATA directory. Another search file is used when estimating the coefficients to ensure that they are stored to the COEF directory and, finally, yet another search file is used when simulating the model to ensure that the simulation results are saved at the SIMRES directory.

In Table 2.1. we show the different sub-directories and what kind of filetypes they contain. As mentioned above there should be noticed that there are three directories that consist of formdata files with datatype «data». The sub-directories COEF and DATA will each consist of a formdata file with regression coefficients and historical time series respectively. The SIMRES sub-directory can consist of many different formdata files for different simulations. For a brief explanation of the different filetypes see Table 3.1 (a more complete description is given in the TROLL Reference Manual, part 3.1.1.).

Table 2.1. The directories

Sub-directory	*Type (extension)*	*Description*
COEF	formdata (DAT)	estimated coefficients.
COMMANDS	disk (INP)	input files.
DATA	formdata (DAT)	historical time series.
MODELS	disk (MOD)	models.
PROGRAMS	disk (SRC and PRG)	source files and programs.
SIMRES	formdata (DAT)	simulation and extrapolation output.

2.2. Files developed for the Implementation Model

This chapter presents the files in the different directories and gives a short explanation of their purpose. For more detailed information, specially of the programs, see inside the uncompiled version of each program (in general we have tried to give the information needed inside the source files, or the *.SRC-files). The six following parts, 2.2.1.-2.2.6., refers to the sub-directories briefly described in Table 2.1.

2.2.1. Coef

The estimated coefficients are stored in a formdata file. When the correct searches are given, estimating and then saving the results (from inside TROLL) will add the coefficients to this formdata file (already existing coefficients will be overwritten).

Table 2.2.

Files	*Description*
REGRCOEF.DAT	contains the estimated regression coefficients that have been estimated by TROLL from the equations in the model.

2.2.2. Commands[3]

This directory contains input files. An input file is «a collection» of TROLL commands passed over, and executed by TROLL, from a file rather than from the keyboard. Generating TROLL commands from a file has the advantage that the commands can be given many times by calling the file, instead of retyping them each time we want them executed. Another advantage is that they can easily be edited using a text editor.

Table 2.3.

Files	*Description*
IM95.INP	generates the main model.
MAINDAT.INP	contains most of the historical time series.
TRANSDAT.INP	a file that is used for calculating historical time series. It defines new variables using time series produced by MAINDAT.INP.
LES-COEF.INP	installs coefficients estimated outside the model, such as the coefficients from the linear expenditure system into the RAM memory.
IO-COEF.INP	reads the i/o-coefficients into the RAM memory.
PYF-COEF.INP	installs the coefficients used in the "value added prices" in the trade and transport sectors into the RAM memory.
MULTIMOD.INP	contains the equations in the sub-model used to calculate the multiplicative residuals.
ADDITMOD.INP	contains the equations in the sub-model used to calculate the additive residuals (among them the volume equations in «production by industry»).
RESADDIT.INP	used for calculating the additive residuals in the model. The residuals are stored with the historical time series.
RESMULTI.INP	simulates the multiplicative residuals from the model. The residuals are then saved together with the historical time series.

2.2.3. Data

The historical time series are stored inside a formdata file. The file is generated from an input file, and it is, through the search and access rules, given the name TIMES.DAT. By running the input file to generate this formdata file, the old version of the file is copied to a new name on the same directory. This is done because the old file must either be renamed or deleted before a new file with the same name can be installed.

Table 2.4.

Files	*Description*
TIMES.DAT	formdata file containing the historical time series.

2.2.4. Programs[4]

This directory contains programs developed by the staff at Statistics Norway to handle the models efficiently. The programs are written as source files (*.SRC) and then compiled in TROLL and given the extension that shows that this is an executable program file (*.PRG).

It should be noticed that the generality of the programs varies a lot. This means that, for instance, while some programs may be used for all models, others may be specific to one model, or even to one simulation. The main programs for organising the simulations, REFSIM and ALTSIM, are examples

[3] We have chosen the name «COMMANDS» on this directory because it contains input files (*.INP), which are files that give commands to TROLL through a text (ASCII) file. All commands in these files are possible to execute directly (online in interactive use of TROLL) but this is not recommendable, first of all because it's easier to undertake corrections and updating inside the text file rather than from the console inside TROLL.

[4] Programs are written as ASCII files, then «compiled into» TROLL format. This means that all programs have two formats, a source file (*.SRC) and a program file (*.PRG). We only show the source files here.

of quite general programs, and may be used over and over again, for different simulations and for different models. The input to this programs, for instance EXTRAP and ALT1REF1, are simulation specific. EXTRAP is the name of a file with one specific set of assumptions about the growth rates for the exogenous variables, while ALT1REF1 is a name of a file where we give specific changes in one or more variables relative to the reference path. When another policy analysis is to be undertaken (other growth rates and/or shifting other variables), new names should be given to the files.

Table 2.5.

Files	*Description*
FOREECON.SRC	for extrapolation of time series, allows the user to set different levels of the variables in different sub-periods (this program is useful for extrapolation of the econometric residuals.
FORECAST.SRC	for extrapolation of time series, allows the user to set different growth rates in different sub-periods.
GORECAST.SRC	for extrapolation of time series, allows the user to set different growth rates in different sub-periods. This is a modified version of FORECAST. See the source file for more details (chapter 7.1.2).
EXTRAP.SRC	this program contains a list of all the exogenous variables in the model. Its purpose is to extrapolate these variables so that the endogenous variables can be simulated beyond the last year of historical data. Each exogenous variable can have different growth rates in different sub-periods. This file is called upon from the program REFSIM, where it is compiled, executed, and then used for input in a simulation. After simulation the formdata file containing the simulation output is stored with the name EXTRAP.DAT. Since this is done automatically, the different versions of EXTRAP should have different names (changes in the file, with respect to extrapolation period, growth rates, etc. should be saved with another name). In this context, the file EXTRAP.SRC is just an example of the program. This example will contain one special way of extrapolating the variables, while another way of extrapolating the variables should be saved with another file name.
REFSIM.SRC	program that organizes the reference path simulation. The program asks for the file where the exogenous variables are prepared for extrapolation, for instance EXTRAP.SRC, then it compiles it and simulates the model using these exogenous variables as input. The reference path is stored with the same name as the file that extrapolates the variables, but with extension DAT.
ALTSIM.SRC	a general program that organizes simulation scenarios, or scenarios where one or more exogenous variables are changed relative to the reference path. The exogenous variables are changed in a source file of the type ALT1REF1.SRC, which is called from this program.
ALT1REF1.SRC	file for making changes in one, or some, of the exogenous variables relative to the reference path, to make alternative scenarios. It passes the variables that are going to be changed to the program DEVIAT.SRC. When different scenarios are of interest, they should be stored with different names, so that this file is just an example of the program. This program is called upon and compiled from ALTSIM. The alternative simulation are then performed and stored in the same formdata file as the reference simulation. The formdata base are stored with the name of this file but with extension DAT e.g. ALT1REF1.DAT. Inside this formdata file the variables from the two different simulations are stored with prefix depending on the names from the simulations. As an example: Assume that we already have performed a reference simulation, saved in the formdata file BASIC.DAT. We want to compare the simulation results with a

	simulation where we have changed some of the variables, e.g. in the file ALT1REF1.SRC. By using the program ALTSIM, both simulations are stored in a new file called ALT1REF1.DAT. Inside this file the values of the variables from the reference simulation (originally stored in BASIC.DAT) has got the name BASIC_varname, and the values from the alternative simulation will have the name ALT1REF1_varname, where varname is the variable name.
DEVIAT.SRC	the program makes per cent changes in exogenous variables over user specified sub-periods. It receives variables from programs of the type ALT1REF1.SRC. The program can also be called separately.
CHANGEXA.SRC	program that makes absolute changes in exogenous variables over user specified sub-periods. The changes are stored in the dosave datatable and will be deleted when leaving TROLL or when typing DELSAVE (varname). Multiple pairs of sub-periods and changes are possible.
CHANGEXP.SRC	program that makes per cent changes in exogenous variables over user specified sub-periods. The changes are stored in the dosave datatable and will be deleted when leaving TROLL or when typing DELSAVE (varname). Multiple pairs of sub-periods and changes are possible.
DEVIA2.SRC	the program makes absolute changes in exogenous variables over user specified sub-periods. It receives variables from programs of the type ALT1REF1.SRC. The program can also be called separately.
PRTREF.SRC	the program prints output from a model simulation. Assumes that the simulation output has been stored in accordance to the REFSIM program.
EQEVAL.SRC	evaluates an individual equation from a model. The program evaluates the left hand side, the right hand side or the residual.
SIM	simulation program that stores the extrapolation and simulation results in a user specified DAT file.
DB	program to open an «unaccessed» and «unsearched» data base. Prompts the model user for file name and nickname.

2.2.5. Models

The model file (**Table 2.6.**) is generated from input files. These files contains commands to the model editor, the equations in the model and a symbol table. If the purpose is to change the model and then reinstall it, the procedure is to first delete the old version of the model, then perform the changes in the input file for the model, before installing it by typing INPUT MODEL_NAME.

The model file is not, in contrast to data files, readable in a text editor. It can, however, be read inside TROLL, in the MODEDIT mode (see the TROLL Reference Manual, parts 4.11-4.12).

Table 2.6.

Files	*Description*
IM95.MOD	the main model in TROLL code, generated from the input file IM95.INP.
ADDIT.MOD	the sub-model used to calculate the additive residuals. Generated from the input file ADDITMOD.INP.
MULTI.MOD	the sub-model used to calculate the multiplicative residuals. Generated from the input file MULTIMOD.INP.

2.2.6. Simres

This directory is aimed at storing the simulation results. Through the access and search rules, we have ensured that one formdata file is always created if the directory is empty. This file, SIMOUT.DAT, will be the target for output when using the FILESIM command when the model is simulated «manually» (Table 2.7). The variables will be saved inside this file with a user supplied prefix. If the

file already exist, new variables will add to it. However, when utilizing the simulation program REFSIM, the output will be saved in a file whose name is the same as the file used to extrapolate the exogenous variables. For example, we have a file called TESTFILE.SRC, consisting of all the exogenous variables to be extrapolated. We use the program REFSIM and, when prompted for «name of the file with the exogenous input to the reference scenario» we type the name TESTFILE. The resulting simulated reference scenario will automatically be saved as TESTFILE.DAT.

A new formdata file will add to this directory if a new reference scenario is simulated. This directory thus, in contrast to the directory for the historical time series, may consist of many formdata files.

Table 2.7.

Files	*Description*
SIMOUT.DAT	here simulation output are stored when the model are simulated «manually». This means that we call and execute the program that extrapolates the exogenous variables, and then simulates interactively (from the keyboard). Note that an empty version of this file will be created also when the simulation programs are used.

3. Organization of input and output

3.1. Introduction

The filesystem commands control access to information stored outside TROLL. The information is classified by the following filetypes:

Table 3.1.

Filetype	*Description*
DATA	dataobjects, for instance time series, regression coefficients, simulation results, etc. (*.DAT).
INPUT	text files containing TROLL commands (*.INP).
MODEL	model created in the model editor (MOD).
SOURCE	source code for TROLL macros and functions written in text format (*.SRC).
PROGRAM	compiled code of the source file (*.PRG).

3.2. Access and search

TROLL can store and retrieve files through the host operating system on the computer. To organize where to get, and where to store the different data objects, some kind of link between the TROLL software and the model system must be established. This is the purpose of the access and search files. The access commands opens data bases and disk directories, while the search commands specifies where TROLL should look for files, and if there is readable or writeable search to them. We have chosen to use only one access file that opens all the relevant data bases, then we have made three different search files, which usage depends on where to store the datatype «data» (DAT-files). As mentioned earlier, both the historical time series, the regression coefficients and the simulated time series are defined as datatype «data» by TROLL, and given extension DAT. To be organized we want to store this three different «objects» in different directories. We use the search file that gives writeable search to the directory where we want to store our output. For instance, when we want to install or update the historical time series we must have writeable search to the directory (and formdata file) for the historical time series. We then use the search file SRCHTIME, which has writeable search to this location.

Note that, since the access and search files instructs where to look for other files, no commands are given to tell where to look for these files themselves. That is why they are stored on the TROLL

directory, which is default. This chapter will show the files in their original shape. We have tried to give comment inside the files to provide essential information to the model user[5].

3.2.1. Access

The following file opens all necessary directories and data bases (formdata files) needed to use the Implementation Model.

3.2.1.1. Accessim.inp

```
option screen off;

/* input file ACCESSIM.INP.

/* Input file for the Implementation Model. Opens data bases or disk directories and adds them
/* to the list of accessed data bases.

/* To ensure that the correct access rules are given the next command deletes all (eventually)
/* earlier searches.

delaccess all;

/* Open the data base for the original timeseries data.
access imtim type formdata id d:\saudi\im\data\times.dat mode w;

/* Open the data base for the estimated regression coefficients.
 access imreg type formdata id d:\saudi\im\coef\regrcoef.dat mode w;

/* Open the directory where the models are stored.
access immod type disk id d:\saudi\im\models mode w;

/* Open the directory where the input files are stored.
access imcom type disk id d:\saudi\im\commands mode w;

/* Open the directory where the programs, both compiled and uncompiled, are stored.
access impro type disk id d:\saudi\im\programs mode w;

/* Open the data base for the simulation output.
access imsim type formdata id d:\saudi\im\simres\simout.dat mode w;
```

3.2.2. Search

In this part we present the three search files. They are distinguished only in where to write dataobjects of type DATA (*.DAT files). The first one has writeable search to the historical time series data base. The second to the coefficient data base, and the third to the data base for simulation output. When the simulation programs are used it does not matter which search file that is used because it will be corrected inside the programs.

3.2.2.1. Srchtime.inp

```
option screen off;

/* Input file SRCHTIME.INP

/* Input file for the Implementation models. Adds entries to the search list, which specifies where
/* TROLL should look for files. This input file should be used when the time series data base is to
/* be updated. Note that there is given a readable search to the datatypes DATA for both the
```

[5] Comments inside a TROLL program must be indicated by a /* (slash followed by a multiplication operator) at the beginning of the line.

```
/* regression coefficients and the simulation output (there is no R after this searches because this
/* is the default value).

/* To ensure that the correct search rules are given the next command deletes all (eventually)
/* earlier searches. Since this file (like all the search files) also install the coefficients temporarily
/* by the DO-command, we delete the DOSAVE datatable.

delsearch all ;
do; delsave all; quit;

/* Writeable search for the original time series data.
search data imtim w;

/* Readable search for the simulated values.
search data imsim;

/* Readable search for the regression coefficients.
search data imreg ;

/* Writeable search for the models.
search model immod w;

/* Writeable search for the program files.
search program impro w;

/* Writeable search for the source files.
search source impro w;

/* Writeable search for the input files (exsclusive access and search files).
search input imcom w;


/* Lists the i/o coefficients into the dosave datatable.
input io-coef

/* Lists the LES (Linear Expenditure System) coefficients into the dosave datatable.
input les-coef

/* Lists the coefficients used in the equations for value added prices in the Trade and Transport sectors.
input pyf-coef

/* To go from DO command mode to TROLL command mode.
quit;
```

3.2.2.2. Srchcoef.inp

```
option screen off;

/* Input file SRCHCOEF.INP

/* Input file for the implementation models. Adds entries to the search list, which specifies where
/* TROLL should look for files. This input file should be used when the coefficients data base is to
/* be updated by estimating coefficients in TROLL. Note that there is given a readable search to the
/* datatypes DATA for both the original time series data and the simulation output (there is no R after
/* this searches because this is the default value).

/* To ensure that the correct search rules are given the next command deletes all (eventually)
/* earlier searches. Since this file (like all the search files) also install the coefficients temporarily
/* by the DO-command, we delete the DOSAVE datatable.
```

```
delsearch all;
do;delsave all; quit;

/* Readable search for the original time series data.
search data imtim;

/* Readable search for the simulated values.
search data imsim;

/* Writeable search for the regression coefficients.
search data imreg w;

/* Writeable search for the models.
search model immod w;

/* Writeable search for the program files.
search program impro w;

/* Writeable search for the source files.
search source impro w;

/* Writeable search for the input files (eksclusive access and search files).
search input imcom w;

/* Lists the i/o-coefficients into the dosave datatable
input io-coef

/* Lists the LES (Linear Expenditure System) coefficients into the dosave datatable.
input les-coef

/* Lists the coefficients used in the equations for value added prices in the Trade and Transport sectors.
input pyf-coef

/* To go from DO-command mode to TROLL-command mode.
quit;
```

3.2.2.3. Srchsimu.inp

```
option screen off;

/* Input file SRCHSIMU.INP.

/* Input file for the implementation models. Adds entries to the search list, which specifies where
/* TROLL should look for files. This input file should be used when we want to simulated the time series
/* and store them, or when already simulated values is to be used. Note that there is given a readable search
/* to the datatypes DATA for both theoriginal time series data and the regression coefficients (there is no R
/* after this searches because this is the default value).

/* To ensure that the correct search rules are given the next command deletes all (eventually)
/* earlier searches. Since this file (like all the search files) also install the coefficients temporarily
/* by the DO-command, we delete the DOSAVE datatable.

delsearch all;
do;delsave all; quit;

/* Readable search for the original time series data.
search data imtim;
```

```
/* Readable search for the regression coefficients.
search data imreg;

/* Writeable search for the simulated values.
search data imsim w;

/* Writeable search for the models.
search model immod w;

/* Writeable search for the program files.
search program impro w;

/* Writeable search for the source files.
search source impro w;

/* Writeable search for the input files (eksclusive access and search files).
search input imcom;

/* Lists the i/o coefficients into the dosave datatable.
input io-coef

/* Lists the LES (Linear Expenditure System) coefficients into the dosave datatable.
input les-coef

/* Lists the coefficients used in the equations for value added prices in the Trade and Transport sectors.
input pyf-coef

/* To go from DO-command mode to TROLL-command mode.
Quit;
```

4. Historical data

The Implementation Models historical data base, TIMES.DAT is located at the \SAUDI\IM\DATA directory. It consist of annual observations, mainly from the National Account, but also from other sources such as SAMA. This chapter presents the four input files that together generates the historical data base TIMES.DAT. To reinstall the whole data base all the four input files have to be executed. They can be executed in one operation by running the DATABANK.INP input file, or by running each of them separately.

4.1. Databank.inp

```
Option screen off;
/* Input file DATABANK.INP.

/* The purpose of this input file is to run the following four input files. The file is stored at
/* the \SAUDI\IM\COMMANDS directory.

/* MAINDAT.INP is an input file that, when executed, installs the first part of the historical time series.
/* The file make repeatedly use of the DEDIT macro to install new time series.

/* TRANSDAT.INP is an input file that generate new time series out of the time series already installed.
/* The file uses the DOFILE command to assign a value to a variable from other variables. The variables
/* assigned to the new variable must be defined earlier; either from the MAINDAT file or in an earlier line
/* in this (TRANSDAT) file.

/* This new time series could, for instance, be a linear combination, or a fraction, of time series earlier installed
```

```
/* variables. The length of the new time serie depends on the length of the time series used to create it. The
/* advantage by using the TRANSDAT file is that all variables in this file is automatically updated when the
/* variables in MAINDAT is updated.

/* TRANSDAT.INP also calculates the value of the production in each of the 16 production sectors. Then
/* it calculates the taxes as "indirect taxes less subsidies" (net taxes as a share of the value of the production
/* in that sector. Then the file aggregate the two variables (time series) "Transport and communication" and
/* "Wholesale and retail trade". Then a price index, adjusted for taxes measured in constant 1989 prices, are
/* calculated. The file also defines the base year value of the taxes.

/* RESADDIT.INP calculates the residuals from the ADDIT model. The model itself, called ADDIT.MOD
/* uses the i/o-coefficients to specify the production volume in each sector. This input file uses the EQEVAL
/* command to take the difference between the right hand side and the left hand side of all the equations in the
/* model, it then assigns this values to variables and store them together with the historical time series.

/* RESMULTI.INP calculates the residuals from the sub-model MULTI that simulates the residuals. The
/* model itself calculates the final demand prices using the i/o-coefficients. First the input file generates
/* a time series data base for the residuals. The residuals are then set arbitrarily (here equal to 1) in each
/* year, starting in 1969. Then the residuals are simulated for the period 1969 to 1991, and saved with the
/* prefix "p". The simulated residuals are then assigned to their original name in the main model.

/* Here we delete the accesses and searches eventually given earlier, and replace them with the correct ones.
delaccess all;
delsearch all;

input accessim;
input srchtime;
input maindat
input transdat
input resaddit
input resmulti
```

4.1.1. Maindat.inp

The file contains the historical timeseries based on the National Account.

```
Option screen off;

/* Input file MAINDAT.INP.

/* This input file is used to generate a part of the time series data base. It's executed automatically with the
/* DATABANK.INP input file. In case this input file should be executed separately all accesses and searches
/* eventually given earlier is deleted and replaced with the correct ones. The time series installed by this file
/* is necessary to perform the calculations in the TRANSDAT file.

delaccess all;
delsearch all;

input accessim;
input srchtime;

host "command.com /c if exist d:\\saudi\\im\\data\\times.dat del d:\\saudi\\im\\data\\times.dat";
/* host "command.com /c copy d:\\saudi\\im\\data\\times.dat d:\\saudi\\im\\data\\timesold.dat";

&DEDIT YAG 1969A; DATA
4431.92 4580.75 4738.20 4916.43 5084.48 5276.68 5500.04 5780.52 6403.85 6990.92 7374.21 7830.07
8697.10 9358.54 10171.94 12098.17 14270.22 16415.44 19105.91 21166.22 22650.00 24232.10
23704.74 24129.31; FILE;

&DEDIT YMI 1969A; DATA
```

505.39 487.00 525.58 659.36 877.01 918.25 985.42 1268.75 1447.18 1377.61 1301.44 1481.64 1681.86 1892.09 1932.13 1892.09 1822.01 1771.96 1731.91 1751.93 1812.00 1872.07 1822.01 1842.03; FILE;

&DEDIT YPS 1969A; DATA
0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 203.12 573.26 916.18 1387.19 2336.33 4827.14 4001.00 3470.75 2591.40 2400.48; FILE;

&DEDIT YMA 1969A; DATA
2038.75 2295.64 2584.84 2899.77 3205.14 3523.08 3946.74 4583.09 5299.92 6140.55 7136.29 8318.22 10205.34 11551.15 12266.76 13888.03 14334.71 13436.63 12437.82 10389.00 11821.00 13220.32 13950.69 14454.47; FILE;

&DEDIT YEW 1969A; DATA
120.85 133.65 146.80 166.36 187.95 177.15 157.95 181.01 230.66 307.59 384.85 421.18 438.42 466.75 510.47 564.04 602.83 635.47 673.03 713.67 750.00 787.56 810.96 841.13; FILE;

&DEDIT YCN 1969A; DATA
9881.58 9328.25 9824.70 11798.16 15243.64 20394.00 28370.15 37117.29 43417.16 45988.64 49053.54 55324.97 62932.15 61634.29 56187.06 48560.92 40347.44 35364.40 34360.22 32645.52 32475.00 32475.00 33460.24 34057.07; FILE;

&DEDIT YTD 1969A; DATA
3515.06 3692.48 3921.87 4478.09 5340.85 6329.85 7637.52 9461.58 11729.89 14301.78 17750.96 21957.96 26131.51 29398.78 30117.78 28124.64 28148.05 27077.91 26606.38 26342.19 26078.00 26599.69 26917.39 27241.78; FILE;

&DEDIT YTC 1969A; DATA
6507.61 7336.77 8329.84 9294.40 11170.31 10004.79 7944.59 9820.10 12067.46 14314.18 16483.93 18181.66 20229.55 21784.04 23142.22 24049.45 23991.09 23338.52 22776.15 23004.28 23121.00 23932.73 24007.00 24346.55; FILE;

&DEDIT YFR 1969A; DATA
5414.09 5678.55 5879.63 6323.62 7006.31 8902.76 11504.45 13601.70 15725.41 17981.37 20457.09 23194.65 26721.09 29271.63 29277.08 27069.66 25208.15 21754.23 21767.84 22543.51 23069.00 23781.22 23544.30 23772.36; FILE;

&DEDIT YRE 1969A; DATA
1556.48 1689.49 1778.69 1901.28 2060.42 3058.86 4486.04 5318.62 6098.39 6768.51 7469.97 8062.67 8489.80 8916.93 9190.49 8580.99 7673.94 6354.15 6078.20 6071.00 6071.00 6193.38 6224.57 6291.76; FILE;

&DEDIT YFI 1969A; DATA
3857.61 3989.07 4100.95 4422.34 4945.89 5843.90 7018.41 8283.08 9627.02 11212.87 12987.12 15131.97 18231.29 20354.70 20086.60 18488.68 17534.21 15400.08 15689.64 16472.51 16998.00 17587.84 17319.73 17480.59; FILE;

&DEDIT YCS 1969A; DATA
3128.83 3432.37 3667.04 3932.70 4188.22 4420.60 4790.78 5498.54 6262.44 7138.72 7715.76 8301.09 9538.27 10230.03 9977.27 10110.30 11493.82 11028.21 10895.18 11241.06 11414.00 11759.88 11613.55 11693.36;FILE;

&DEDIT YGS 1969A; DATA
18795.89 19250.53 20044.22 21572.76 23438.92 26020.75 29408.94 31748.04 32850.08 34678.02 36946.40 40408.77 43697.47 46899.35 50025.25 53248.83 56277.05 56429.00 56168.51 56342.17 57840.00 71114.22 69648.95 66457.93; FILE;

&DEDIT YBC 1969A; DATA

-616.10 -635.49 -642.61 -607.44 -595.43 -705.52 -872.63 -1155.23 -1682.64 -2373.16 -3117.39 -3991.30 -4421.74 -4617.39 -4721.74 -4800.00 -4617.39 -4408.70 -4200.00 -4134.78 -4200.00 -4278.26 -4317.39 -4395.65; FILE;

&DEDIT YO 1969A; DATA
58639.14 69212.03 85306.90 106847.03 129125.61 137280.08 134607.56 145197.57 152930.35 154227.90 162960.14 169457.69 167515.79 112575.78 81008.40 74226.93 60243.29 87724.97 78253.27 94759.50 93252.00 115182.86 142696.20 149684.05; FILE;

&DEDIT YOG 1969A; DATA
55425.50 65411.81 81334.13 102873.43 124985.56 133237.78 130666.47 140898.80 148294.54 149341.69 157840.29 164385.30 162401.52 107355.44 75651.27 68780.46 53590.84 80798.94 69345.18 84505.84 83847.00 105255.82 128308.14 134592.50; FILE;

&DEDIT YPR 1969A; DATA
3213.63 3800.22 3972.78 3973.60 4140.05 4042.29 3941.09 4298.77 4635.81 4886.21 5119.85 5072.39 5114.27 5220.35 5357.14 5446.47 6652.45 6926.03 8908.09 10253.66 9405.00 9927.03 14388.06 15091.55; FILE;

&DEDIT YID 1969A; DATA
2850.61 2908.33 3537.82 3753.85 4023.44 3199.50 2099.46 3022.94 3237.44 3138.81 3380.24 3400.73 3093.43 3216.35 3574.86 3830.94 3779.73 3195.87 3451.95 8296.96 6740.00 6944.86 6944.86 7641.40; FILE;

&DEDIT Y 1969A; DATA
115213.63 127700.88 147864.84 176035.08 208296.44 225741.96 236080.97 266125.92 289919.21 304212.95 327827.46 354287.31 376460.26 333661.40 303672.61 293437.28 276817.18 295151.11 286364.50 309888.37 310823.00 351095.00 377394.90 384166.27; FILE;

&DEDIT JGB 1969A; DATA
8299 7624 7569 9426 13623 17054 25872 40700 55699 66783 75892 76261 80031 80366 67128 49997 32625 22619 24206 19996 21401 33307 32708 33971; FILE;

&DEDIT JGT 1969A; DATA
124 119 129 165 265 486 564 642 822 967 835 797 730 920 2356 1962 2066 1724 1908 1643 1605 6554 6380 6724; FILE;

&DEDIT JGM 1969A; DATA
301 304 371 320 475 932 1322 4736 7890 5257 7676 12574 15456 14700 8966 9122 6862 4538 4474 2944 3279 1433 1395 1486; FILE;

&DEDIT JG 1969A; DATA
8724 8047 8069 9911 14363 18472 27758 46078 64411 73007 84403 89632 96217 95986 78450 61081 41553 28881 30588 24583 26285 41294 40483 42181; FILE;

&DEDIT JOB 1969A; DATA
1566 1782 2709 5058 9079 8034 6669 9951 11495 9375 4852 7046 7212 8886 7969 7475 9093 6463 4406 716 1248 1935 1894 2766;FILE;

&DEDIT JOT 1969A; DATA
61 45 35 43 43 61 99 204 463 632 744 1308 1577 1720 1912 1249 959 333 127 108 118 341 332 489; FILE;

&DEDIT JOM 1969A; DATA
263 357 479 559 1117 1846 2188 2521 2858 2863 1456 4296 9272 8292 10020 4947 951 3745 3131 441 168 1854 1805 2664; FILE;

&DEDIT JO 1969A ; DATA

1890 2184 3223 5660 10239 9941 8956 12676 14816 12870 7052 12650 18061 18898 19901 13671 11003 10541 7664 1265 1534 4130 4031 5919; FILE;

&DEDIT JPH 1969A; DATA
6898 7324 8000 8399 9150 10399 11177 12111 12278 10702 10421 10041 11349 13503 16160 14958 11909 9770 9408 8434 8366 6803 7998 8096; FILE;

&DEDIT JPB 1969A; DATA
314 303 317 573 656 1511 3086 3696 4918 6361 8141 10731 13665 14400 17120 17071 14720 13370 12974 13064 13202 11399 13669 14720; FILE;

&DEDIT JPT 1969A; DATA
986 1100 1119 1278 1782 3611 6957 10373 12823 12868 11523 12140 10512 12032 14485 11346 9841 7783 6934 6012 6052 5055 6298 6769; FILE;

&DEDIT JPM 1969A; DATA
411 425 450 476 549 728 1327 2391 3041 3183 3864 6483 10593 10239 11238 10199 8219 6498 5501 4770 4970 4009 4971 5343; FILE;

&DEDIT JP 1969A; DATA
8609 9152 9886 10726 12137 16249 22547 28571 33060 33114 33949 39395 46119 50174 59003 53574 44689 37421 34817 32280 32590 27266 32936 34928; FILE;

&DEDIT J 1969A; DATA
19223 19383 21178 26297 36739 44662 59261 87325 112287 118991 125404 141677 160397 165058 157354 128326 97245 76843 73069 58128 60409 72690 77450 83028; FILE;

&DEDIT CPFOO 1969A; DATA
5496 6162 6643 7246 7507 9188 10925 12381 16504 24206 33249 37951 43251 54576 61273 59910 62675 55016 54351 53730 52272 56592 56278; FILE;

&DEDIT CPCLO 1969A; DATA
1262 1407 1452 1470 1535 1962 2746 3088 4289 4975 8366 9064 10302 13066 14832 14697 15606 13690 13544 13398 13027 14310 14319; FILE;

&DEDIT CPREN 1969A; DATA
5200 5690 5560 5683 6109 6221 4708 4581 5546 7081 15442 18805 20607 25035 25879 23377 22421 19617 19353 19168 18614 20011 20333; FILE;

&DEDIT CPFUR 1969A; DATA
1581 1731 1901 1781 2008 2432 3291 3689 3564 4906 10136 12448 13686 16767 18105 16801 16782 14725 14577 14392 14024 15185 15427; FILE;

&DEDIT CPMED 1969A; DATA
215 236 276 293 338 449 509 770 1680 2532 1341 1620 1750 1966 2003 1803 1747 1528 1507 1495 1448 1599 1585; FILE;

&DEDIT CPTRA 1969A; DATA
4009 4391 4794 5331 5183 8124 9647 9122 13319 16776 20390 23613 24805 29018 31027 28187 27408 24044 23747 23487 22861 20999 25079; FILE;

&DEDIT CPENT 1969A; DATA
305 334 369 364 425 487 684 793 2126 3876 2157 2686 3058 3844 4167 3925 3871 3369 3307 3290 3177 3462 3433; FILE;

&DEDIT CPOTH 1969A; DATA
892 974 1062 1157 1057 1356 1781 2087 3977 6012 5379 6376 8242 11297 12796 12968 14038 12327 12189 12050 11735 13338 12914; FILE;

&DEDIT CPN 1969A; DATA
1796.81 2118.61 2407.16 2834.60 3491.90 3942.81 3617.10 3363.77 4363.41 5658.44 6130.88 6476.15
7760.43 7718.37 8535.10 8174.18 8191.78 6903.59 7190.18 7218.55 8808.00 11838.23 12712.67; FILE;

&DEDIT CPABR 1969A; DATA
1238.31 1474.04 1666.73 1892.68 2018.86 1932.79 2003.21 2501.08 4032.83 7060.15 11701.38
6376.44 16265.34 15644.23 15190.37 14344.29 13992.16 11317.95 10314.39 8006.00 16683.00
20590.63 22180.10; FILE;

&DEDIT CPR 1969A; DATA
18401.50 20280.43 21316.57 22383.08 22688.96 28208.97 32677.11 35648.31 50674.43 71765.71
102030.50 112463.28 134205.91 163494.85 176737.27 167838.11 170348.38 148730.36 145699.21 141797.45
145033.00 154248.41 158835.43; FILE;

&DEDIT M 1969A; DATA
15167 15584 17228 21044 29179 42705 64665 95092 136631 165991 187115 196048 239430 284933
311863 255768 188543 146493 142302 116472 135961 153427 168807 162244; FILE;

&DEDIT X 1969A; DATA
68190 80280 98886 121591 141496 144855 144070 158604 173247 178336 183558 188820 191975
141553 106916 96252 82360 113539 105152 125189 120287 146743 174574 168785; FILE;

&DEDIT XOG 1969A; DATA
58465.495 67776.331 86783.604 108291.89 127162.79 129810.05 130502.68 144456.24 158945.69
162610.85 166540.57 170314.16 171677.51 120912.24 87022.599 73795.898 55063.115 82400.956
66539.03 82387.134 75809 96819.388 125096.1; FILE;

&DEDIT XPR 1969A; DATA
7831.7386 10292.152 9599.0779 10287.202 10514.926 10415.915 8678.2793 10193.141 9326.7987
8821.8446 8836.6962 8950.5584 9638.6821 9703.039 7361.4383 8326.7916 10712.947 13232.767
18455.576 20673.414 19614 20594.205 20539.749 24282.35; FILE;

&DEDIT XPS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 774.35361 2451.5037 5115.0449 8012.4086 8191.043 8304.3234
8573.001 9742.1129 8937.5317 10947.532; FILE;

&DEDIT XX 1969A; DATA
76.94196 106.827 96.52061 203.666 332.1796 686.3219 1279.99 597.5676 619.3311 1245.591 2048.6
3074.633 2898.573 3216.175 3219.571 3501.63 3277.372 2982.094 4778.642 6603.608 7483 7752.113
7288.797; FILE;

&DEDIT PXOG 1969A; DATA
0.1407326 0.1445785 0.1681654 0.1989069 0.4030818 0.7113856 0.8493389 0.8567508 0.8360906
0.8322815 1.1249631 1.8843178 2.1117909 1.9761027 1.6846658 1.6196158 1.4764511 0.7210717
0.9104731 0.7265091 1 1.3280398 1.157694; FILE;

&DEDIT PXPR 1969A; DATA
0.1165769 0.1747934 0.208145 0.2034567 0.2340482 0.6632158 0.7784953 0.7684579 0.7855857
0.7821493 1.2469592 1.8858041 1.8730776 1.6880278 1.7284666 1.5962931 1.7081201 0.9546001
1.1559108 0.9972228 1 1.3112912 1.1613092 0.7944865; FILE;

&DEDIT PXPS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.3615919 0.3328569 0.4652941 0.5801002 0.7128518 1.1043645 1
0.8358556 0.8405005 0.6116447; FILE;

&DEDIT PXX 1969A; DATA

0.272933 0.271467 0.279733 0.2946 0.337167 0.4138 0.576567 0.764767 0.878367 0.9072 0.9465 0.984833 1.019467 1.020467 1.020633 1.0121 0.978833 0.949333 0.949433 0.976133 1 1.020367 1.071233; FILE;
&DEDIT CG 1969A; DATA
20330 22809 24397 26724 34901 47560 62689 77941 82385 102629 114653 109437 141975 153550 150526 134637 127226 115794 118727 98477 114299 123377 134657 123267; FILE;

&DEDIT DS 1969A; DATA
4238 533 -684 83 1650 3162 2048 1702 7956 -1515 -10704 -2061 -12664 -5062 24001 22151 -11819 -13263 -13981 2770 6756 7465 6202 7313; FILE;

&DEDIT VYSAG 1969A; DATA
67 81 110 151 322 594 928 1381 1816 2444 2695 3720 4906 5579 6858 7757 8383 10371 11858 13781 15014 16098 17619; FILE;

&DEDIT VYSMI 1969A; DATA
5 6 8 12 25 46 81 141 193 234 183 282 404 374 342 368 365 352 345 387 399 379 401; FILE;

&DEDIT VYSPS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 94 240 321 647 1103 2580 2201 1889 1610; FILE;

&DEDIT VYSMA 1969A; DATA
94 114 154 213 453 835 1165 1623 2204 2797 3259 4183 5059 5490 5657 5805 5028 6267 5872 5553 6501 7197 8666; FILE;

&DEDIT VYSEW 1969A; DATA
18 22 29 39 83 152 184 207 264 397 494 353 1511 1775 438 0 0 2168 1988 1119 1456 1561 1697; FILE;

&DEDIT VYSCN 1969A; DATA
398 484 653 901 1918 3540 6192 11239 15436 17269 19285 24404 29288 28686 25192 24299 22128 16995 16625 16654 16887 16831 18516; FILE;

&DEDIT VYSTD 1969A; DATA
362 441 595 820 1746 3223 4787 6691 8834 11140 13527 19370 22621 25020 23725 25072 23461 25827 24550 22713 22463 24085 26384; FILE;

&DEDIT VYSTC 1969A; DATA
79 96 130 179 382 705 1111 1848 2744 3764 5191 5941 6535 7293 6835 7315 7393 7573 7284 7088 7317 7845 8570; FILE;

&DEDIT VYSFR 1969A; DATA
489 595 803 1107 2356 4351 6565 9404 11377 13799 15579 19704 23588 25532 26779 26692 22425 19525 18453 18792 19299 20692 22618; FILE;

&DEDIT VYSRE 1969A; DATA
315 389 530 729 1523 2763 4117 5862 6938 8259 9160 10869 11827 11582 11405 11486 9485 6898 5610 5109 5079 5407 6049; FILE;

&DEDIT VYSFI 1969A; DATA
174 206 273 378 833 1588 2448 3542 4439 5540 6419 8835 11761 13950 15374 15206 12940 12627 12843 13683 14220 15285 16569; FILE;

&DEDIT VYSCS 1969A; DATA
59 72 97 134 286 527 789 1055 1218 1425 1600 2413 3301 4009 4298 4640 4539 5292 5254 5776 5935 5916 6183; FILE;

&DEDIT VYSGS 1969A; DATA

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0; FILE;

&DEDIT VYSBC 1969A; DATA
-46 -48 -51 -53 -59 -189 -443 -766 -1312 -2066 -2992 -3599 -3959 -4364 -4527 -4669 -4530
-4304 -4132 -4104 -4200 -4327 -4672; FILE;

&DEDIT VYSO 1969A; DATA
10675 12993 17531 24171 51446 94975 115106 128125 135783 137376 196718 328567 364002
243370 155665 127789 96903 57931 64264 62320 83197 127735 141067; FILE;

&DEDIT VYSOG 1969A; DATA
10129 12329 16635 22936 48817 90121 109259 122070 129909 130994 187158 313048 349464
231370 144392 115681 84502 55458 57647 55996 77206 121736 134443; FILE;

&DEDIT VYSPR 1969A; DATA
546 664 896 1235 2629 4854 5847 6055 5874 6382 9560 15519 14538 12000 11273 12108 12401 2473
6617 6324 5991 5999 6624; FILE;

&DEDIT VYS 1969A; DATA
12200 14856 20059 27674 58958 108759 136465 160948 178557 188579 255539 405338 457256
342764 251356 225308 186416 148644 153464 152659 176469 225901 248659; FILE;

&DEDIT VYWAG 1969A; DATA
221 232 252 292 384 607 847 989 1202 1922 2531 2369 2425 3290 3813 4504 5638 6301 7204 7420
8084 10447 10738; FILE;

&DEDIT VYWMI 1969A; DATA
60 63 69 80 105 166 325 565 781 899 1117 1342 1586 1535 1460 1510 1614 1406 1378 1373 1413 1617
1607; FILE;

&DEDIT VYWPS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 90 304 606 647 1103 2111 1800 1863 1491; FILE;

&DEDIT VYWMA 1969A; DATA
182 191 207 241 316 500 784 1113 1545 2064 2679 3355 4176 4989 5761 6098 6160 6267 5872 4543
5320 7097 8025; FILE;

&DEDIT VYWEW 1969A; DATA
44 47 50 59 77 122 184 239 302 379 466 843 1260 2069 2365 2537 2595 1628 1493 746 970 1254
1281; FILE;

&DEDIT VYWCN 1969A; DATA
1043 1094 1186 1375 1810 2860 5777 10271 14760 17491 20559 25070 29948 28798 25324 20866
17013 16995 16625 15374 15588 18725 19343; FILE;

&DEDIT VYWTD 1969A; DATA
260 273 296 344 452 714 1140 1651 2260 2877 3618 4450 5349 6066 5900 5802 5710 5730 5447 4986
4931 6372 6554; FILE;

&DEDIT VYWTC 1969A; DATA
431 453 491 569 748 1183 2190 3946 6326 8437 10058 12030 14405 16314 18498 19705 19430 17888
17203 16696 17237 22273 22847; FILE;

&DEDIT VYWFR 1969A; DATA
115 121 131 152 199 315 496 714 992 1310 1729 2179 2887 3787 3893 3516 3234 2905 2989 3590 3740
4831 4948; FILE;

&DEDIT VYWRE 1969A; DATA

74 79 86 100 129 200 311 445 604 784 1016 1201 1443 1713 1660 1513 1367 1026 909 976 984 1262 1323; FILE;

&DEDIT VYWFI 1969A; DATA
41 42 45 52 70 115 185 269 388 526 713 978 1444 2074 2233 2003 1867 1879 2080 2614 2756 3569 3625; FILE;

&DEDIT VYWCS 1969A; DATA
193 203 220 255 335 530 880 1329 1887 2498 3270 3201 3493 4126 4559 4749 5017 5292 5254 5331 5479 6582 6460; FILE;

&DEDIT VYWGS 1969A; DATA
1682 1774 1988 2376 3027 4286 6572 9124 13057 17809 22247 28377 35199 44676 48519 52072 54971 54138 53061 56308 57840 72616 86970; FILE;

&DEDIT VYWBC 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0; FILE;

&DEDIT VYWO 1969A; DATA
273 287 311 361 474 751 1112 1434 1960 2642 3465 4532 6699 6927 8196 9636 11184 9225 9027 9066 10055 16741 17323; FILE;

&DEDIT VYWOG 1969A; DATA
229 241 261 303 398 630 935 1190 1580 2027 2589 3240 5242 5424 5680 6315 7275 5804 5742 5715 6641 12620 13051; FILE;

&DEDIT VYWPR 1969A; DATA
44 46 50 58 76 121 177 244 380 615 876 1292 1457 1503 2516 3321 3909 3421 3285 3351 3414 4121 4272; FILE;

&DEDIT VYW 1969A; DATA
4504 4738 5201 6104 7927 12034 20307 31375 45072 58328 71739 87748 107427 122577 128378 131299 133172 128422 126656 127544 132457 170418 187587; FILE;

&DEDIT VYTAG 1969A; DATA
706 712 701 684 512 146 -246 -582 48 -173 -625 -690 -1076 -497 -1028 -641 -232 -811 -750 -306 -448 -1403 -1455; FILE;

&DEDIT VYTMI 1969A; DATA
-15 -20 -22 -18 -12 -7 0 0 -12 -22 3 -1 -57 -14 47 -14 -167 0 0 0 0 -184 -142; FILE;

&DEDIT VYTPS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 -5 -68 0 0 0 0 -133 -102; FILE;

&DEDIT VYTMA 1969A; DATA
135 158 160 138 -84 -180 0 0 -30 -23 191 -48 151 308 177 1155 2252 0 0 0 0 -509 -546; FILE;

&DEDIT VYTEW 1969A; DATA
200 221 230 221 173 2 -189 -294 -384 -540 -690 -834 -2313 -4298 -3098 -3123 -2294 -3273 -2800 -1143 -1676 -2035 -2167; FILE;

&DEDIT VYTCN 1969A; DATA
-449 -590 -739 -804 -1467 -1280 0 1 -269 -210 -805 -1483 -1711 -49 1963 -201 -396 -1 0 -1 0 -1457 -1373; FILE;

&DEDIT VYTTD 1969A; DATA
365 345 251 206 -248 -799 -786 -723 -901 -958 -207 -2533 -1871 -2068 643 -488 1051 -2485 -2200 -897 -1316 -3075 -3187; FILE;

&DEDIT VYTTC 1969A; DATA
719 813 937 1098 1315 717 -49 -154 -303 -297 -257 -817 -960 -1588 -2123 -3176 -3104 -2678 -2400 -977 -1433 -5379 -4464; FILE;

&DEDIT VYTFR 1969A; DATA
384 361 244 120 -744 -967 23 30 -13 15 956 -221 -626 804 1626 292 1525 28 30 30 30 -1361 -2543; FILE;

&DEDIT VYTRE 1969A; DATA
248 236 161 79 -477 -620 14 19 -7 9 581 -99 -537 165 965 118 -204 10 9 8 8 -355 -680; FILE;

&DEDIT VYTFI 1969A; DATA
136 125 83 41 -267 -347 9 11 -6 6 375 -122 -89 639 661 174 1729 18 21 22 22 -1006 -1863; FILE;

&DEDIT VYTCS 1969A; DATA
-24 -20 -32 -65 -244 -234 0 0 -32 -26 97 -27 110 376 435 315 1477 0 -1 0 0 -513 -458; FILE;

&DEDIT VYTGS 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0; FILE;

&DEDIT VYTBC 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0; FILE;

&DEDIT VYTP 1969A; DATA
2021 1980 1730 1580 -799 -2602 -1247 -1722 -1896 -2234 -1337 -6654 -8353 -7026 -1350 -5886 44 -9220 -8121 -3294 -4843 -16049 -16437;
FILE;

&DEDIT VYTO 1969A; DATA
-2114 -2033 -1740 -1581 851 2203 10 3 -337 -257 -1870 1975 2169 -3439 -8179 -3296 -9601 0 1 0 0 4723 15228; FILE;

&DEDIT VYTOG 1969A; DATA
-2617 -2682 -2302 -1929 584 2049 1 1 -323 -245 -2002 6760 1030 -819 -6207 -1691 -3491 0 1 0 0 4921 9470; FILE;

&DEDIT VYTPR 1969A; DATA
503 649 562 348 267 154 9 2 -14 -12 132 -4785 1139 -2620 -1972 -1605 -6110 0 0 0 0 -198 5758; FILE;

&DEDIT VYT 1969A; DATA
-93 -53 -10 -1 52 -399 -1237 -1719 -2233 -2491 -3207 -4679 -6184 -10465 -9529 -9182 -9557 -9220 -8120 -3294 -4843 -11326 -1209; FILE;

&DEDIT GROIL 1969A; DATA
4548.81 5861.87 8145.85 11615.85 25134.39 65910.85 96623.91 111287.62 120958.23 118005.94 164434.08 279961.88 335235.71 236928.24 161375.36 131640.31 98612.90 59724.31 70398.00 51015.00 68978.00 118142.00 132436.00 113100.00 127400.00; FILE;

&DEDIT GROTH 1969A; DATA
867.19 763.62 1234.36 1589.10 2165.94 4111.68 8060.26 12807.57 16260.14 16993.85 20304.82 27101.47 36895.94 55297.15 62825.48 54755.21 47677.34 42850.98 38834.10 36290.48 52449.00 36579.00 38769.00 37900.00 41750.00; FILE;

&DEDIT GRTOT 1969A; DATA

5416 6625.497 9380.209 13204.95 27300 70023 104684 124095 137218 135000 184739 307063.4
372131.7 292225.4 224200.8 186395.5 146290.2 102575.3 109232.1 87305.48 121427 154721 171205
151000 169150; FILE;

&DEDIT GECH1 1969A; DATA
1682 1774 1988 2376 3027 4286 6572 9125 13057 17809 22247 28377 35199 44676 48519 52072
54971 54138 54917 57729 59732 72616 90240 73196 77235; FILE;

&DEDIT GECH2 1969A; DATA
484.92 543.6723 566.4972 643.0339 836.51 1108.6 1244.8 2085.5 3866 4404.9 6810.84 11724.21
19208.9 21619.09 27536 29434 42743 45169 54175 35615 36387 58989.15 100432.8 33344 28816; FILE;

&DEDIT GECH3 1969A; DATA
1620.11 1701.989 1844.588 2264.339 3189.9 6445.3 19345 35762 47069 57016
64132.1 50978.1 51196.17 42116.34 45412 44932 29089 27061 25327 22939 22183 25417.94 29289.06
23053 28470; FILE;

&DEDIT GECH4 1969A; DATA
2150.7 2286.678 2774.576 3947.627 7092 14922 32022 50766 63050 67327 81887
129683.5 167717.5 155860.6 119943.8 100856.2 73031 51051.46 50500.16 24573.14 36557 53406.9
56813.1 51407 62429; FILE;

&DEDIT GESS 1969A; DATA
0.00 17.02 55.41 67.44 107.58 249.71 412.56 589.34 844.63 1028.23 1083.80 1091.81 1316.93
1569.95 1573.71 1540.15 1511.43 1351.96 1064.00 1001.00 1380.00 1322.00 1321.00; FILE;

&DEDIT GETOT 1969A; DATA
5937.73 6306.34 7173.66 9231.00 14145.45 26761.83 59183.55 97739.10 127042.53 146556.82
175076.89 220762.84 273321.54 264271.99 241411.41 227294.19 199833.44 177419.28 184919.35 140856.38
154859.00 210430.00 276775.00 181000.00 196950.00; FILE;

&DEDIT ZG 1969A; DATA
-521.73 319.16 2206.55 3973.95 13154.88 43260.69 45500.62 26356.08 10175.83 -11557.03 9662.01
86300.51 98810.11 27953.40 -17210.57 -40898.67 -53543.20 -74843.99 -75687
-53550.91 -33432.00 -55709.00 -105570.00 -30000.00 -27800.00; FILE;

&DEDIT VX 1969A; DATA
9728 12293 17404 24664 55214 101471 120723 134946 144928 148715 206226 347345 391591
266510 171681 145530 113163 85989 99045 103079 120287 183638 197278; FILE;

&DEDIT VXMER 1969A; DATA
9026 11483 16454 23466 53477 98968 117377 130640 138813 141083 197524 337916 380270 254380
158444 132299 99536 74376 86880 91288 106242 166339 178806; FILE;

&DEDIT VXTRC 1969A; DATA
99 114 132 192 315 525 893 1312 1798 2076 2551 2631 2927 3764 3950 4324 4989 4421 4641 4117 4271
3999 3910; FILE;

&DEDIT VXTDP 1969A; DATA
26 30 33 35 38 45 65 101 153 208 235 286 359 452 500 550 660 731 770 683 966 1300 1271;
FILE;

&DEDIT VXNDP 1969A; DATA
577 666 785 971 1384 1933 2388 2893 4164 5348 5916 6512 8035 7914 8787 8357 7978 6461 6754 6991
8808 12000 13291; FILE;

&DEDIT VM 1969A; DATA

5035 5219 5776 7317 11584 21284 35778 54795 80759 103600 128736 149438 187592 205502 212775 190638 137892 115239 119170 114399 135961 154636 182842; FILE;

&DEDIT VMMER 1969A; DATA
4052 4190 4671 5917 8980 15797 25285 37743 58495 78101 82223 100350 119298 139335 135417 118737 85564 70780 75313 81582 79219 90139 108924; FILE;

&DEDIT VMMIS 1969A; DATA
92 95 96 138 254 500 798 930 1023 1603 2823 1603 4210 4010 3910 3666 3407 2648 2422 1938 4171 5218 5798; FILE;

&DEDIT VMHDP 1969A; DATA
426 464 543 649 800 947 1322 2152 3849 6671 11291 6412 16842 16041 15638 14665 13628 10592 9689 7753 16683 20871 23190; FILE;

&DEDIT VMGDP 1969A; DATA
465 470 466 613 1550 4040 8373 13970 17392 17225 32399 41073 47242 46116 57810 53570 35293 31219 31746 23126 35888 38408 44930; FILE;

&DEDIT ZRPI 1969A; DATA
269 324 395 563 5509 12495 11039 10696 13572 13933 16568 27239 43594 54462 58633 51148 46826 42475 40198 39459 39074 34452 32456; FILE;

&DEDIT ZEPI 1969A; DATA
3438 4452 6431 8992 18338 27670 16997 7315 11384 16207 22366 37263 50736 39508 26969 24617 27589 18563 17272 13033 9651 14991 18953; FILE;

&DEDIT ZECO 1969A; DATA
353 451 561 633 782 983 1214 1534 1926 2418 3796 4085 5428 5499 5426 5587 5650 5336 5543 6917 9285 13035 15862; FILE;

&DEDIT ZNCT 1969A; DATA
1315 1399 1615 2176 3783 6035 8922 13265 19594 25144 27480 41559 52306 44508 43360 40681 35961 33381 33143 33481 38804 51407 115870; FILE;

&DEDIT Z 1969A; DATA
-144 1096 3416 6109 26236 57994 68851 68733 44837 15279 40416 142239 139123 25955 -58216 -64845 -47103 -44055 -35885 -25292 -34340 -15979 -103793; FILE;

&DEDIT VXO 1969A; DATA
8010 9369 15697 17874 21583 115684 95587 125350 141807 125265 194459 334543 375320 249978 154178 127423 93623 66665 76271 75440 89965 149649 163036 162116 154083; FILE;

&DEDIT PYAG 1969A; DATA
0.2243 0.2238 0.2244 0.2293 0.2396 0.2553 0.2780 0.3093 0.4788 0.5998 0.6239 0.6895 0.7192 0.8945 0.9480 0.9605 0.9663 0.9663 0.9584 0.9872 1.0000 1.0376 1.1349 1.1930; FILE;

&DEDIT PYMI 1969A; DATA
0.0990 0.1006 0.1046 0.1123 0.1345 0.2233 0.4122 0.5563 0.6648 0.8062 1.0015 1.0951 1.1492 1.0016 0.9570 0.9852 0.9945 0.9921 0.9948 1.0046 1.0000 0.9679 1.0241 1.0510; FILE;

&DEDIT PYPS 1969A; DATA
0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.0001 0.9458 0.9407 0.9378 0.9329 0.9443 0.9718 1.0000 1.0426 1.1575 1.2213; FILE;

&DEDIT PYMA 1969A; DATA
0.2016 0.2017 0.2015 0.2041 0.2137 0.3278 0.4938 0.5970 0.7017 0.7878 0.8589 0.9005 0.9197 0.9339 0.9452 0.9402 0.9376 0.9328 0.9442 0.9718 1.0000 1.0427 1.1573 1.2210;FILE;

```
&DEDIT PYEW 1969A; DATA
2.1653 2.1642 2.1020 1.9217 1.7713 1.5593 1.1329 0.8398 0.7879 0.7662 0.7013 0.8599 1.0457 -
0.9722 -0.5784 -1.0390 0.4992 0.8236 1.0119 1.0112 1.0000 0.9898 1.0000 0.8335; FILE;
&DEDIT PYCN 1969A; DATA
0.1004 0.1059 0.1120 0.1248 0.1483 0.2511 0.4219 0.5795 0.6893 0.7513 0.7958 0.8674 0.9141
0.9319 0.9340 0.9259 0.9603 0.9611 0.9677 0.9810 1.0000 1.0500 1.10904 1.1463; FILE;

&DEDIT PYTD 1969A; DATA
0.2808 0.2868 0.2912 0.3059 0.3651 0.4957 0.6731 0.8052 0.8690 0.9131 0.9542 0.9694 0.9987
0.9870 1.0050 1.0804 1.0737 1.0736 1.0448 1.0175 1.0000 1.0294 1.1053 1.1467;FILE;

&DEDIT PYTC 1969A; DATA
0.1888 0.1856 0.1870 0.1986 0.2189 0.2604 0.4093 0.5743 0.7265 0.8316 0.9095 0.9435 0.9876
1.0108 1.0029 0.9915 0.9887 0.9762 0.9697 0.9914 1.0000 1.0337 1.1227 1.1678;FILE;

&DEDIT PYFR 1969A; DATA
0.1825 0.1897 0.2003 0.2181 0.2585 0.4155 0.6158 0.7461 0.7858 0.8411 0.8928 0.9339 0.9674
1.0291 1.1032 1.1267 1.0784 1.0324 0.9864 0.9941 1.0000 1.0160 1.0628 1.0918;FILE;

&DEDIT PYRE 1969A; DATA
0.4094 0.4168 0.4368 0.4776 0.5704 0.7659 0.9902 1.1893 1.2357 1.3373 1.4400 1.4847 1.4998
1.5095 1.5267 1.5286 1.3875 1.2487 1.0740 1.0036 1.0000 1.0195 1.0750 1.1098;FILE;

&DEDIT PYFI 1969A; DATA
0.0910 0.0935 0.0978 0.1065 0.1286 0.2320 0.3765 0.4614 0.5008 0.5415 0.5780 0.6404 0.7194
0.8186 0.9094 0.9402 0.9431 0.9431 0.9525 0.9907 1.0000 1.0148 1.0584 1.0853;FILE;

&DEDIT PYCS 1969A; DATA
0.0729 0.0743 0.0777 0.0824 0.0900 0.1862 0.3484 0.4335 0.4907 0.5459 0.6437 0.6731 0.7238 0.8320
0.9313 0.9598 0.9599 0.9597 0.9644 0.9881 1.0000 1.0191 1.0492 1.0771;FILE;

&DEDIT PYGS 1969A; DATA
0.0895 0.0922 0.0992 0.1101 0.1291 0.1647 0.2235 0.2874 0.3975 0.5136 0.6021 0.7022 0.8055 0.9526
0.9699 0.9779 0.9768 0.9594 0.9447 0.9994 1.0000 1.0211 1.2487 1.1873;FILE;

&DEDIT PYBC 1969A; DATA
0.0747 0.0756 0.0793 0.0873 0.0992 0.2677 0.5074 0.6632 0.7796 0.8706 0.9599 0.9018 0.8953 0.9452
0.9587 0.9727 0.9812 0.9762 0.9838 0.9925 1.0000 1.0115 1.0822 1.1479;FILE;

&DEDIT PYO 1969A; DATA
0.1506 0.1625 0.1888 0.2148 0.4087 0.7134 0.8635 0.8923 0.8985 0.9062 1.2169 1.9773 2.2259
2.1928 1.9218 1.8070 1.6348 0.7655 0.9366 0.7533 1.0000 1.2953 1.2167 1.2220;FILE;

&DEDIT PYOG 1969A; DATA
0.1397 0.1512 0.1794 0.2071 0.3984 0.6965 0.8433 0.8748 0.8845 0.8891 1.1895 1.9652 2.1905
2.1981 1.9017 1.7491 1.6474 0.7582 0.9141 0.7303 1.0000 1.3232 1.2233 1.2279;FILE;

&DEDIT PYPR 1969A; DATA
0.3401 0.3576 0.3796 0.4129 0.7179 1.2689 1.5308 1.4657 1.3460 1.4296 2.0641 2.3711 3.3504
2.0849 2.2059 2.5384 1.5334 0.8510 1.1116 0.9435 1.0000 0.9995 1.1575 1.1688;FILE;

&DEDIT PYID 1969A; DATA
0.0951 0.0983 0.1054 0.1169 0.1198 0.1381 0.2449 0.3007 0.4359 0.5817 0.6391 0.7451 0.8526 1.0100
1.0285 1.0371 1.0344 1.0153 1.0003 0.9926 1.0000 1.0079 1.0079 1.1909;FILE;

&DEDIT PY 1969A; DATA
```

0.1465 0.1553 0.1733 0.1944 0.3237 0.5353 0.6610 0.7196 0.7685 0.8094 0.9951 1.3857 1.4906
1.3730 1.2312 1.1975 1.1341 0.9185 0.9619 0.9202 1.0000 1.1165 1.1713 1.1847;FILE;

&DEDIT PM 1969A; DATA
0.3320 0.3349 0.3353 0.3477 0.3970 0.4984 0.5533 0.5762 0.5911 0.6241 0.6880 0.7623 0.7835
0.7212 0.6823 0.7454 0.7314 0.7867 0.8374 0.9822 1.0000 1.0079 1.0831 1.1203;FILE;

&DEDIT PX 1969A; DATA
0.1427 0.1531 0.1760 0.2028 0.3902 0.7005 0.8379 0.8508 0.8365 0.8339 1.1235 1.8396 2.0398
1.8828 1.6058 1.5120 1.3740 0.7574 0.9419 0.8234 1.0000 1.2514 1.1301 1.1618;FILE;

&DEDIT PCG 1969A; DATA
0.1592 0.1603 0.1680 0.1817 0.2141 0.2723 0.3636 0.4655 0.5543 0.6144 0.6765 0.7573 0.8179
0.8536 0.8408 0.8991 0.8991 0.9186 0.9072 0.9892 1.0000 1.0108 1.2253 1.2085;FILE;

&DEDIT PDS 1969A; DATA
0.1371 0.1407 0.1447 0.1566 0.1800 0.2587 0.3838 0.4935 0.5847 0.6554 0.7189 0.7865 0.8264
0.8198 0.8182 0.8851 0.8989 0.9287 0.9205 0.9863 1.0000 1.0194 1.1835 1.2232;FILE;

&DEDIT PJGB 1969A ; DATA
0.1472 0.1468 0.1546 0.1649 0.1756 0.2768 0.4508 0.4968 0.5427 0.6397 0.6967 0.7638 0.7921
0.7606 0.7396 0.7828 0.8190 0.8979 0.9072 0.9724 1.0000 1.0357 1.1219 1.2026; FILE;

&DEDIT PJGT 1969A; DATA
0.2500 0.2521 0.2558 0.2667 0.2906 0.3519 0.3812 0.4206 0.4355 0.4726 0.5389 0.5320 0.6425
0.5859 0.5382 0.6662 0.6602 0.7593 0.8323 0.9775 1.0000 0.9948 1.0871 1.1449; FILE;

&DEDIT PJGM 1969A; DATA
0.3123 0.3289 0.3423 0.3563 0.4211 0.4925 0.5386 0.5921 0.6286 0.6717 0.6455 0.6627 0.6333
0.6161 0.5978 0.6434 0.6836 0.7858 0.8616 1.0119 1.0000 1.0300 1.1254 1.1851; FILE;

&DEDIT PJG 1969A; DATA
0.1544 0.1552 0.1648 0.1727 0.1858 0.2897 0.4536 0.5055 0.5519 0.6397 0.6905 0.7475 0.7655
0.7368 0.7174 0.7583 0.7888 0.8720 0.8958 0.9775 1.0000 1.0290 1.1165 1.1928; FILE;

&DEDIT PJOB 1969A; DATA
0.1545 0.1594 0.1646 0.2015 0.2024 0.2664 0.4945 0.4925 0.5060 0.6418 0.6750 0.7306 0.7476
0.7271 0.7054 0.7410 0.7719 0.8867 0.8963 0.9707 1.0000 1.0264 1.1156 1.1869; FILE;

&DEDIT PJOT 1969A; DATA
0.2787 0.2889 0.2857 0.3023 0.3256 0.3934 0.4343 0.4755 0.4924 0.5253 0.5390 0.5321 0.6424
0.5860 0.5382 0.6661 0.6601 0.7598 0.8346 0.9815 1.0000 0.9941 1.0873 1.1452; FILE;

&DEDIT PJOM 1969A; DATA
0.3384 0.3529 0.3633 0.3918 0.4548 0.5520 0.5932 0.6378 0.6690 0.7125 0.6456 0.6627 0.6333
0.6160 0.5978 0.6434 0.6835 0.7858 0.8617 1.0113 1.0000 1.0297 1.1252 1.1851; FILE;

&DEDIT PJO 1969A; DATA
0.1841 0.1937 0.1955 0.2210 0.2305 0.3202 0.5180 0.5211 0.5370 0.6518 0.6546 0.6870 0.6798
0.6655 0.6351 0.6989 0.7545 0.8469 0.8811 0.9858 1.0000 1.0252 1.1176 1.1826; FILE;

&DEDIT PJPH 1969A ; DATA
0.0865 0.0911 0.0945 0.1062 0.1291 0.2238 0.3758 0.5255 0.6036 0.6442 0.6870 0.7425 0.7457
0.6596 0.6176 0.7151 0.7544 0.8359 0.8481 0.9631 1.0000 1.0218 1.1827 1.3225; FILE;

&DEDIT PJPB 1969A; DATA
0.1146 0.1221 0.1262 0.1361 0.1433 0.3031 0.3911 0.5463 0.6409 0.6944 0.7958 0.8674 0.9141
0.9319 0.9341 0.9260 0.9604 0.9613 0.9678 0.9811 1.0000 1.0500 1.0904 1.1463; FILE;

&DEDIT PJPT 1969A; DATA
0.2465 0.2518 0.2565 0.2684 0.2901 0.3539 0.3878 0.4168 0.4351 0.4666 0.5387 0.5322 0.6423
0.5861 0.5381 0.6660 0.6603 0.7591 0.8324 0.9774 1.0000 0.9949 1.0870 1.1448; FILE;
&DEDIT PJPM 1969A; DATA
0.3139 0.3271 0.3422 0.3676 0.4098 0.4959 0.5411 0.5834 0.6310 0.6896 0.6454 0.6627 0.6332
0.6161 0.5978 0.6434 0.6835 0.7858 0.8617 1.0117 1.0000 1.0299 1.1253 1.1853; FILE;

&DEDIT PJP 1969A; DATA
0.1167 0.1224 0.1251 0.1387 0.1662 0.2723 0.3913 0.4935 0.5463 0.5892 0.6580 0.6986 0.7462
0.7112 0.6861 0.7583 0.7885 0.8560 0.8917 0.9802 1.0000 1.0298 1.1174 1.1928; FILE;

&DEDIT PJ 1969A; DATA
0.1405 0.1440 0.1510 0.1693 0.1918 0.2901 0.4396 0.5039 0.5483 0.6270 0.6797 0.7285 0.7503
0.7208 0.6953 0.7519 0.7848 0.8608 0.8923 0.9792 1.0000 1.0291 1.1170 1.1921; FILE;

&DEDIT PCPFOO 1969A; DATA
0.3393 0.3330 0.3381 0.3465 0.4062 0.5175 0.6580 0.7983 0.9466 0.8694 0.8468 0.9134 0.9333
0.8936 0.8720 0.9275 0.9165 0.9406 0.9246 0.9696 1.0000 1.0033 1.0812; FILE;

&DEDIT PCPCLO 1969A; DATA
0.3796 0.3746 0.3974 0.4388 0.5107 0.6228 0.6730 0.8229 0.8830 0.9349 0.8650 0.9830 1.0211
0.9880 0.9674 1.0367 1.0049 1.0167 0.9932 1.0112 1.0000 0.9879 0.9874; FILE;

&DEDIT PCPREN 1969A; DATA
0.2833 0.2849 0.3191 0.3489 0.3943 0.6039 1.2062 1.7044 1.6906 1.5184 1.4404 1.4562 1.4274
1.3089 1.2946 1.3457 1.3261 1.2132 1.0418 1.0153 1.0000 0.9859 1.0329; FILE;

&DEDIT PCPFUR 1969A; DATA
0.4181 0.4200 0.4187 0.4992 0.5378 0.6924 0.7739 0.9490 1.1684 1.0856 0.9839 0.9864 0.9923
0.9296 0.8952 0.9485 0.9065 0.9125 0.9191 1.0029 1.0000 0.9839 1.0134; FILE;

&DEDIT PCPMED 1969A ; DATA
0.3256 0.3263 0.3043 0.3208 0.3402 0.3987 0.5305 0.4831 0.4720 0.6473 0.7897 0.8049 0.7857
0.7909 0.8023 0.8569 0.8781 0.8946 0.9031 0.9719 1.0000 0.9744
0.9703; FILE;

&DEDIT PCPTRA 1969A; DATA
0.2028 0.2036 0.2042 0.2052 0.2564 0.2550 0.3248 0.4722 0.5461 0.5830 0.6017 0.6396 0.6564
0.6395 0.6069 0.6387 0.6480 0.7237 0.8160 0.9456 1.0000 1.1392 1.1948; FILE;

&DEDIT PCPENT 1969A; DATA
0.4984 0.5000 0.4959 0.5632 0.5859 0.7967 0.8567 1.0164 1.1185 1.1009 1.0640 1.0517 1.0314
0.9534 0.9184 0.9259 0.8956 0.9095 0.9289 0.9802 1.0000 0.9731 1.0041; FILE;

&DEDIT PCPOTH 1969A; DATA
0.3744 0.3778 0.3776 0.3889 0.5147 0.6268 0.7215 0.8457 0.9253 0.9433 0.9355 0.9716 0.9273
0.8215 0.8412 0.89.6 0.8628 0.9151 0.9459 1.0132 1.0000 0.9426 0.9511; FILE;

&DEDIT PCPN 1969A; DATA
0.3150 0.3144 0.3261 0.3426 0.3963 0.4905 0.6602 0.8600 0.9543 0.9450 0.9650 1.0055 1.0354
1.0253 1.0295 1.0224 0.9739 0.9359 0.9393 0.9685 1.0000 1.0137 1.0455; FILE;

&DEDIT PCPABR 1969A; DATA
0.3149 0.3141 0.3264 0.3424 0.3963 0.4905 0.6599 0.8604 0.9542 0.9450 0.9649 1.0056 1.0355
1.0254 1.0295 1.0224 0.9740 0.9359 0.9394 0.9684 1.0000 1.0136 1.0455; FILE;

&DEDIT PCPR 1969A; DATA

0.3082 0.3072 0.3190 0.3372 0.3956 0.4935 0.6571 0.8484 0.9227 0.8981 0.9177 0.9653 0.9772 0.9249 0.9017 0.9495 0.9310 0.9423 0.9303 0.9831 1.0000 1.0105 1.0624; FILE;

&DEDIT ENP 1969A; DATA
256.9 279 295.4 304.7 319.7 328 537.6 683.8 918.6 1203.1 1676.1 2079.4 2440.1 2780.8 3105.1 3339.7 3360 3309 3416.3 3592.4 3807.5 3316.6 2951.5 3724.3 4120.4 4222.1; FILE;

&DEDIT ENG 1969A; DATA
36.1 38 41.6 46.3 54.3 63.4 71.5 81.2 91.7 102.6 106 131.5 157.2 179.4 214.7 242.9 259.4 269.4 269.7 271.2 260.5 269.1 267.5 251.8 262.9 261.4; FILE;

&DEDIT ESP 1969A; DATA
1090.4 1103.6 1122.2 1135.4 1152.1 1159.8 1178.4 1201 1219 1242.8 1250.6 1269.8 1301.1 1329.8 1367.6 1361 1358 1369.1 1345.4 1406.7 1492.9 1554.1 1607.2 1648.6 1719 1779.6; FILE;

&DEDIT ESG 1969A; DATA
94.1 105.3 118 132.1 148 166 178.6 192.1 206.6 222.3 239.1 257.2 275.2 296.3 305 325.3 355.6 379 406.4 424.3 488.6 502.1 526.4 565.6 578.6 605; FILE;

&DEDIT LSM 1969A; DATA
1471.24 1530.091 1591.295 1654.948 1721.147 1789.993 1861.594 1936.059 2013.502 2094.043 2177.806 2264.919 2355.517 2449.739 2547.73 2649.64 2755.627 2865.853 2980.489 3099.71 3223.7 3352.648 3486.754 3626.224 3771.273 3937.6;FILE;

&DEDIT LSW 1969A; DATA
1460.652 1519.079 1579.843 1643.038 1708.76 1777.111 1848.197 1922.125 1999.011 2078.973 2162.133 2248.619 2338.565 2432.109 2529.394 2630.571 2735.796 2845.229 2959.039 3077.402 3200.5 3328.52 3461.661 3600.127 3744.132 3909.1;FILE;

&DEDIT D7985 1969A; DATA
0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 ; FILE;

&DEDIT D9091 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0.5 0 0 0 ; FILE;

&DEDIT ICSAB 1969A; DATA
15 17 18 19 28 88 211 395 513 636 874 1468 2251 3148 3447 2834 1742 1181 694 627 651 664 601 690 769; FILE;

&DEDIT ICSCB 1969A; DATA
0 0 0 0 4 24 62 125 132 79 48 258 356 278 244 256 280 291 273 288 324 274 276 280 331; FILE;

&DEDIT ICMOF 1969A; DATA
0 0 0 1 4 26 123 328 429 526 636 396 165 170 218 291 180 95 85 37 22 5 102 64 34; FILE;

&DEDIT ICPIF 1969A; DATA
0 0 0 55 194 428 1070 2795 5318 5054 3425 5050 8079 9510 7070 4354 1978 387 382 130 2520 364 44 20 6; FILE;

&DEDIT ICIDF 1969A; DATA
0 0 0 0 0 16 860 2061 3954 6301 6831 6809 5967 5338 5351 3227 1292 558 542 440 828 379 1050 1179 1055; FILE;

&DEDIT ICREF 1969A; DATA
0 0 0 0 0 0 1067 5793 8413 6716 7686 8220 7516 8184 9008 8971 7414 4894 3972 3389 2978 2445 1740 2678 3235; FILE;

```
&DEDIT KP 1969A; DATA
101963 108031 114633 121860 130268 142542 160855 184909 213091 240748 268254 299693
335887 373990 418903 449872 477240 495897 510374 520730 529989 532796 534021 ; FILE;

&DEDIT LIABP 1969A; DATA
1652.6 1732.4 1725.6 1824.9 3099.2 5710.5 8422.5 8662.5 11584.3 18937.4 29312.1 40036.4 46542
50711.4 57383.8 60335.9 58881.6 57632 58642.2 70522.6 73280.7 65295.3 73616.2 87160.6
103213.9; FILE;

&DEDIT M0 1969A; DATA
 1528.3 1641.6 1951.2 2487.8 3374.4 5051.6 8558.5 13607.7 17969.6 21009.6 25198.8
 26143.8 30421.1 35280.6 34654.9 34749.8 36867.8 38812.4 40072.3 35945.3 33877.2
44776.2 44620.1 43769.6 42622.8 ; FILE;

&DEDIT M1 1969A; DATA
2340.4 3609.5 3260.6 4747.1 6569.6 10684.1 19570.3 31217.3 45297 50485.9 55647.3 63409.2 76587.7
87042.5 86321.4 83110.5 83038.6 86381 92012.8 93664.2 91751.7 102264.6 120470.5 127929.5
124891.1 ; FILE;

&DEDIT M2 1969A; DATA
2822.1 3174.8 3998.4 5561.4 7483.1 12223.2 21142.2 33027.9 48357.2 54651.1 67277.3 83403.4
102954.7 116092.8 119896.8 119699.9 122720.7 127350.2 133266.3 134142.8 136413.7
141545.5 165093.5 174255.0 172783.4 ; FILE;

&DEDIT THR 1969A; DATA
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ; FILE;

&DEDIT POIL 1970A; DATA
1.21 1.69 1.82 2.81 10.98 10.43 11.63 12.57 12.91 29.19 36.01 34.17 31.76 28.67 28.10 27.53 13.90 17.23
13.40 16.21 20.82 17.47 17.89 15.65; FILE;

/* do;delsave all;

input io-coef;
input les-coef;
input pyf-coef;
```

4.1.2. Transdat.inp

```
option screen off;

/* Input file TRANSDAT.INP.

/* This input file is executed automatically with the DATABANK.INP file, which generate the whole time
/* serie data base in one operation. The search is given to the formdata file for the original time series. In some
/* cases, when changes has been done inside this file, it will be preferable to run only this file. Therefore it
/* must have it's own access and search commands. It also must have a delaccess and delsearch command to
/* delete accesses and searches given earlier.

delaccess all;
delsearch all;

input accessim;
input srchtime;

/* This file is used to generate new variables that is suitable for use in the model. Often this is very simple
/* definitions of variables, like summation, linear combinations, products etc.

/* Here we define CPRii "Private resident consumption by object of expenditure" (ii is the nine consumer
```

```
/* groups used in the model. This consumer groups also coincide with those in the National Account and in
/* the Cost of Living Index).

DOFILE CPRFOO=CPFOO-0.07*CPN;
DOFILE CPRCLO=CPCLO-0.06*CPN;
DOFILE CPRREN=CPREN;
DOFILE CPRFUR=CPFUR-0.22*CPN;
DOFILE CPRMED=CPMED;
DOFILE CPRTRA=CPTRA-0.01*CPN;
DOFILE CPRENT=CPENT;
DOFILE CPROTH=CPOTH-0.64*CPN;
DOFILE CPRABR=CPABR;

/* Definition of private consumption as the sum of consumption of residents and non-residents.

DOFILE CP = CPR + CPN;

/* The volum series of consumption (in constant prices) are multiplied with their respective price
/* indexes to give the value of consumption in current prices.

DOFILE VCPR = PCPR * CPR ;
DOFILE VCPN = PCPN*CPN;
DOFILE VCP = VCPR + VCPN;

/* Here we go the other way, defining the price index for private consumption from the value and volum
/* observations.

DOFILE PCP = VCP / CP ;

/* We aggregate gross fixed capital formation in the National Account sectors "Non-oil private transport
/* equipment" and "Non-oil private machinery equipment" into "Non-oil private, transport and machinery".
/* We also make the corresponding price index.

DOFILE JPTM = JPT+JPM;
DOFILE PJPTM = (PJPT*JPT+PJPM*JPM)/JPTM;

/* We aggregate gross fixed capital formation in the National Account sectors "Non-oil Government transport
/* equipment" and "Government machinery equipment" into "Government, transport and machinery". We
/* also make the corresponding price index.

DOFILE JGTM = JGT+JGM;
DOFILE PJGTM = (PJGT*JGT+PJGM*JGM)/JGTM;

/* We aggregate gross fixed capital formation in the National Account sectors "Oil sector, transport
/* equipment" and "Oil sector, machinery equipment" into "Oil sector, transport and machinery". We also
/* make the corresponding price index.

DOFILE JOTM = JOT+JOM;
DOFILE PJOTM = (PJOT*JOT+PJOM*JOM)/JOTM;

/* Here we define some employment/unemployment data.

DOFILE EP = ENP+ESP;
DOFILE EG = ENG+ESG;
DOFILE E = EP + EG;
DOFILE EN = ENP+ENG;
DOFILE ES = ESP + ESG;
DOFILE LS = LSW + LSM;
```

```
DOFILE US = LS - ES;

/* Definition of production in private non-oil sector and its corresponding price index.

DOFILE YP =
YAG + YMI + YPS + YMA + YEW + YCN + YTD + YTC + YRE+ YFI + YCS + YBC;

DOFILE PYP=
(PYAG*YAG + PYMI*YMI + PYPS*YPS + PYMA*YMA + PYEW*YEW + PYCN*YCN +
PYTD*YTD + PYTC*YTC + PYRE*YRE+ PYFI*YFI + PYCS*YCS + PYBC*YBC)/YP;

/* Renaming of production in goverment sector and its corresponding price index.

DOFILE YG = YGS;
DOFILE PYG = PYGS;

/* Definition of "Compensation of employees" in Government and private sectors.

DOFILE VYWP =
VYWAG+ VYWMI+ VYWPS+ VYWMA+ VYWEW+ VYWCN+ VYWTD+ VYWTC+ VYWRE+
VYWFI+ VYWCS+ VYWBC;

DOFILE WP= VYWP/EP;

DOFILE VYWG = VYWGS;

DOFILE WG= VYWG/EG;

/* We exclude operating surplus in government services from the operating surplus in non-oil private
/* sector (exclusive imputed bank charges).

DOFILE VYSP =
VYSAG + VYSMI + VYSPS + VYSMA + VYSEW + VYSCN + VYSTD + VYSTC + VYSRE +
VYSFI + VYSCS + VYSBC;

/* Definition of houshold sectors operating surplus, which is calculated using information provided by
/* Coopers & Lybrand.

DOFILE VYSH =
VYSAG + 0.24*VYSMI + 0.47*VYSMA + 0.1*VYSEW + 0.11*VYSCN + 0.59*VYSTD +
0.7*VYSTC + 0.58*VYSRE + 0.03*VYSFI + 0.67*VYSCS;

/* Household sectors share of non-oil operating surplus.

DOFILE VYSSHARE=VYSH/VYSP;

/* Definition of operating surplus for the companies.

DOFILE VYSC = VYSP - VYSH;

/*Renaming of operating surplus in Government sector.

DOFILE VYSG=VYSGS;

/* Disposable income and financial wealth for houshold sector.

DOFILE HR = VYW + VYSH + GESS;
DOFILE HW = M2- M0 - LIABP;
```

```
/* Credit disbursement variables.

DOFILE ICH= ICSCB + ICMOF + ICREF;
DOFILE ICB= ICIDF + ICMOF + ICREF;
DOFILE ICTM= ICSAB + ICSCB + ICMOF + ICPIF + ICIDF;

/* Definition of depreciation, depreciation rate, private non-oil.

DOFILE DKP = JP- KP+ KP(-1);
DOFILE DKPRATE = DKP / KP(-1);

/* Domestic absorption.

DOFILE DA = CP + CG + J + DS;

/* Productivity in private and government sector respectively.

DOFILE QP=YP/EP;
DOFILE QG = YG/EG;

/* Value of "other export of goods and services". This is defined as toal exports exclusive export of
/* crude oil, refined products, basic petrochemicals and non-residential direct purchase in Saudi Arabia.

DOFILE VXX=PXX*XX;

/* Value of export of crude oil and natural gas.

DOFILE VXOG=PXOG*XOG;

/* Value of export of refined product.

DOFILE VXPR=PXPR*XPR;

/* Value of export of basic petrochemicals.

DOFILE VXPS=PXPS*XPS;

/* Aggregate import marked share relative to the market share in the baseyear (with I-O weights).

DOFILE MS=M / (A.M.CPFOO * CPFOO + A.M.CPCLO * CPCLO + A.M.CPREN * CPREN +
               A.M.CPFUR * CPFUR + A.M.CPMED * CPMED + A.M.CPTRA * CPTRA +
               A.M.CPENT * CPENT +A.M.CPOTH * CPOTH + A.M.CPABR * CPABR +
               A.M.JPH * JPH + A.M.JPB * JPB + A.M.JPTM * JPTM + A.M.JGB * JGB +
               A.M.JGTM * JGTM + A.M.JOB * JOB + A.M.JOTM * JOTM +A.M.CG * CG +
               A.M.DS * DS + A.M.XOG * XOG + A.M.XPR * XPR + A.M.XPS * XPS +
               A.M.XX * XX);

/* Value of the sum of investment in the private non-oil sectors for "non-residential building", "residential
/* building" and "transport and machinery equipment".

DOFILE VJP = PJPH*JPH + PJPB*JPB + PJPTM*JPTM;

/* Value of government consumption.

DOFILE VCG= PCG*CG;

/* Value of government investment.
```

```
DOFILE VJG = PJGB*JGB + PJGTM*JGTM;

/* Value of oil-sector investment.

DOFILE VJO = PJOB*JOB + PJOTM*JOTM;

/* Value of total investment.

DOFILE VJ = VJP + VJG + VJO ;

/* Value of total GDP.

DOFILE VY=PY*Y;

/* Value of government services.

DOFILE VYG=PYGS*YGS;

/* Value of GDP, privat sector.

DOFILE VYP=PYP*YP;

/* Definition of private sector net financial investment (budget deficit/surplus in privat sector).

DOFILE ZP = Z - ZG;

/* Definition of capital account.

DOFILE ZR = Z - VX + VM;

DOFILE GECH12=GECH1+GECH2;

DOFILE GROSHARE=GROIL/VYSO;

/* Value of GDP by sector.

DOFILE VYAG = PYAG * YAG ;
DOFILE VYMI = PYMI * YMI ;
DOFILE VYPS = PYPS * YPS ;
DOFILE VYMA = PYMA * YMA ;
DOFILE VYEW = PYEW * YEW ;
DOFILE VYCN = PYCN * YCN ;
DOFILE VYTD = PYTD * YTD ;
DOFILE VYTC = PYTC * YTC ;
DOFILE VYRE = PYRE * YRE ;
DOFILE VYFI = PYFI * YFI ;
DOFILE VYCS = PYCS * YCS ;
DOFILE VYOG = PYOG * YOG ;
DOFILE VYPR = PYPR * YPR ;
DOFILE VYGS = PYGS * YGS ;
DOFILE VYID = PYID * YID ;
DOFILE VYBC = PYBC * YBC ;

/* Renaming Indirect taxes less subsidies in Government sector.
DOFILE VYTG = VYTGS;

/* Indirect taxes less subsidies as shares of the value of production.
```

```
DOFILE TAG = VYTAG / VYAG;
DOFILE TMI = VYTMI / VYMI;
DOFILE TPS = VYTPS / VYPS;
DOFILE TMA = VYTMA / VYMA;
DOFILE TEW = VYTEW / VYEW;
DOFILE TCN = VYTCN / VYCN;
DOFILE TTD = VYTTD / VYTD;
DOFILE TTC = VYTTC / VYTC;
DOFILE TRE = VYTRE / VYRE;
DOFILE TFI = VYTFI / VYFI;
DOFILE TCS = VYTCS / VYCS;
DOFILE TGS = VYTGS / VYGS;
DOFILE TBC = VYTBC / VYBC;
DOFILE TOG = VYTOG / VYOG;
DOFILE TPR = VYTPR / VYPR;
/* DOFILE TID = VYTID / VYID;

/* Aggregation of "Transport and communication" and "Wholesale and retail trade".

DOFILE TTDTC = (VYTTD + VYTTC) / (VYTD + VYTC);

/* Prices net of taxes, measured in base year (1989) value.

DOFILE PYFAG=PYAG*(1-TAG)/(1 -VALUES(TAG, 1989A));
DOFILE PYFMI=PYMI*(1-TMI)/(1 -VALUES(TMI, 1989A));
DOFILE PYFPS=PYPS*(1-TPS)/(1-VALUES(TPS, 1989A));
DOFILE PYFMA=PYMA*(1-TMA)/(1-VALUES(TMA, 1989A));
DOFILE PYFEW=PYEW*(1-TEW)/(1-VALUES(TEW, 1989A));
DOFILE PYFCN=PYCN*(1-TCN)/(1-VALUES(TCN, 1989A));
DOFILE PYFTD=PYTD*(1-TTD)/(1-VALUES(TTD, 1989A));
DOFILE PYFTC=PYTC*(1-TTC)/(1-VALUES(TTC, 1989A));
DOFILE PYFRE=PYRE*(1-TRE)/(1-VALUES(TRE, 1989A));
DOFILE PYFFI=PYFI*(1-TFI)/(1-VALUES(TFI, 1989A));
DOFILE PYFCS=PYCS*(1-TCS)/(1-VALUES(TCS, 1989A));
DOFILE PYFGS=PYGS*(1-TGS)/(1-VALUES(TGS, 1989A));
DOFILE PYFBC=PYBC*(1-TBC)/(1 -VALUES(TBC, 1989A));
DOFILE PYFOG=PYOG*(1-TOG)/(1-VALUES(TOG, 1989A));
DOFILE PYFPR=PYPR*(1-TPR)/(1-VALUES(TPR, 1989A));
/* DOFILE PYFID=PYID*(1-TID)/(1-VALUES(TID,1989A));

/* Definition of net indirect taxes, as shares of the value of production, in the base year (1989) value.

DOFILE TAG.0 = VALUES(TAG, 1989A);
DOFILE TMI.0 = VALUES(TMI, 1989A);
DOFILE TPS.0 = VALUES(TPS, 1989A);
DOFILE TMA.0 = VALUES(TMA, 1989A);
DOFILE TEW.0 = VALUES(TEW, 1989A);
DOFILE TCN.0 = VALUES(TCN, 1989A);
DOFILE TTD.0 = VALUES(TTD, 1989A);
DOFILE TTC.0 = VALUES(TTC, 1989A);
DOFILE TRE.0 = VALUES(TRE, 1989A);
DOFILE TFI.0 = VALUES(TFI, 1989A);
DOFILE TCS.0 = VALUES(TCS, 1989A);
DOFILE TGS.0 = VALUES(TGS, 1989A);
DOFILE TBC.0 = VALUES(TBC, 1989A);
DOFILE TOG.0 = VALUES(TOG, 1989A);
DOFILE TPR.0 = VALUES(TPR, 1989A);
/* DOFILE TID.0 = VALUES(TID, 1989A);
```

4.1.3. Calculation of residuals. Additive and multiplicative residuals

In the Implementation Model there are both additive and multiplicative residuals. Just like «ordinary» variables they must have numerical values in the historical data base before the model can be simulated. These input files generates the residuals into the historical data base, and thus is a part of the system to generate the data base. The additive residuals are calculated by the file RESADDIT.INP, while the multiplicative residuals, which are simulated, are generated from the file RESMULTI.INP. There are more information inside the files.

4.1.3.1. Resaddit.inp

```
option screen off;

/* Input file RESADDIT.INP.

/* This file is runned automatically with the DATABANK.INP file for generation of the time series data base.
/* It's aim is to calculate the additive residuals from the equations in the main model and store them in the
/* historical data base. To calculate the residuals it uses the sub-model ADDIT (generated with the input
/* file ADDITMOD.INP) which consist of 44 equations. The equations in this sub-model itself has no
/* residual. Instead this file, when it's executed, runs the ADDIT model and takes the difference
/* between the right and the left hand side, equation by equation. The differences (residuals) are stored together
/* with the historical time series. The first number in the bracket's after the EQEVAL command is the equation
/* number, the second means that the difference should be measured in the same unit as the variable in the
/* equation, not as relative difference.

/* In some cases, when changes has been done inside this file or inside the sub-model itself (changes in
/* the i/o-coefficients), it will be preferable to run only this file. Therefore it must have it's own access and
/* search commands. It also must have a delaccess and delsearch command to delete accesses and searches
/* given earlier.

delaccess all;
delsearch all;

input accessim;
input srchtime;

/* Tell TROLL to use the sub-model ADDIT.

USEMOD ADDIT;

DOFILE RYAG=EQEVAL(1,2);
DOFILE RYMI=EQEVAL(2,2);
DOFILE RYPS=EQEVAL(3,2);
DOFILE RYMA=EQEVAL(4,2);
DOFILE RYEW=EQEVAL(5,2);
DOFILE RYCN=EQEVAL(6,2);
DOFILE RYTD=EQEVAL(7,2);
DOFILE RYTC=EQEVAL(8,2);
DOFILE RYRE=EQEVAL(9,2);
DOFILE RYFI=EQEVAL(10,2);
DOFILE RYCS=EQEVAL(11,2);
DOFILE RYGS=EQEVAL(12,2);
DOFILE RYBC=EQEVAL(13,2);
DOFILE RYOG=EQEVAL(14,2);
DOFILE RYPR=EQEVAL(15,2);
DOFILE RYID=EQEVAL(16,2);

DOFILE RPYFAG=EQEVAL(17,2);
DOFILE RPYFMI=EQEVAL(18,2);
```

```
DOFILE RPYFMA=EQEVAL(19,2);
DOFILE RPYFCN=EQEVAL(20,2);
DOFILE RPYFTD=EQEVAL(21,2);
DOFILE RPYFTC=EQEVAL(22,2);
DOFILE RPYFCS=EQEVAL(23,2);
DOFILE RPYFGS=EQEVAL(24,2);

DOFILE RCPRFOO=EQEVAL(25,2);
DOFILE RCPRCLO=EQEVAL(26,2);
DOFILE RCPRREN=EQEVAL(27,2);
DOFILE RCPRFUR=EQEVAL(28,2);
DOFILE RCPRMED=EQEVAL(29,2);
DOFILE RCPRTRA=EQEVAL(30,2);
DOFILE RCPRENT=EQEVAL(31,2);
DOFILE RCPROTH=EQEVAL(32,2);

DOFILE RCPR=EQEVAL(33,2);
DOFILE RJPH=EQEVAL(34,2);
DOFILE RJPB=EQEVAL(35,2);
DOFILE RJPTM=EQEVAL(36,2);
DOFILE RWP=EQEVAL(37,2);
DOFILE REP=EQEVAL(38,2);

DOFILE RVCPR=EQEVAL(39,2);
DOFILE RPCPN=EQEVAL(40,2);

DOFILE RGECH12=EQEVAL(41,2);
DOFILE RGECH3=EQEVAL(42,2);
DOFILE RGECH4=EQEVAL(43,2);
DOFILE RGROTH=EQEVAL(44,2);
```

4.1.3.2. Resmulti.inp

```
option screen off;

/* Input file RESMULTI.INP.

/* The aim of this file is to calculate the multiplicative residuals in the main model. Residuals must,
/* like other variables, have their values available from the data base before the model can be simulated.
/* This is done by simulating the residulals in the following way. This file calls upon the sub-model
/* called MULTI, consisting of the 21 equations for final demand prices. In this sub-model the 21 endogenous
/* variables are the residuals rather than the final demand prices. The right hand side variables, the final
/* demand prices, uses historical values while the residuals are first installed into the data base as arbitrary
/* values, here set equal to one in each year.

/* The model is simulated and the results are stored with the prefix "P". Note that from this model only
/* the simulated endogenous variables are stored (that's why the argument "'N" is in the FILESIM command).
/* After the values are stored (with prefix "P") they are given their original names (without the prefix).

/* The reason why to simulate the residuals, rather than to define them as the difference between the right
/* and the left hand side of the equations, is that the residuals appear as multiplicative. This method will not
/* affect the residuals in any way since there are no lags or simultaneity in the sub-model.

/* In some cases it will be preferable to run only this file. Therefore it must have it's own access and search
/* commands. It also must have a delaccess and delsearch command to delete eventually accesses and searches /*
given earlier.

delaccess all;
delsearch all;
```

```
input accessim;
input srchtime;
usemod multi;

&DEDIT RPCPFOO 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPCLO 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPREN 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPFUR 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPMED 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPTRA 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPENT 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPOTH 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCPABR 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJPH 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJPB 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJPTM 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJGB 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJGTM 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJOB 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPJOTM 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPCG 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPXOG 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPXPR 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPXPS 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;
&DEDIT RPXX 1969A;
DATA 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1; FILE;

simulate;
simstart 1969a;
dotil 1991a;
filesim p: 'n ;

DOFILE RPCPFOO=P_RPCPFOO;
DOFILE RPCPCLO=P_RPCPCLO;
DOFILE RPCPREN=P_RPCPREN;
DOFILE RPCPFUR=P_RPCPFUR;
DOFILE RPCPMED=P_RPCPMED;
DOFILE RPCPTRA=P_RPCPTRA;
```

```
DOFILE RPCPENT=P_RPCPENT;
DOFILE RPCPOTH=P_RPCPOTH;
DOFILE RPCPABR=P_RPCPABR;
DOFILE RPJPH=P_RPJPH;
DOFILE RPJPB=P_RPJPB;
DOFILE RPJPTM=P_RPJPTM;
DOFILE RPJGB=P_RPJGB;
DOFILE RPJGTM=P_RPJGTM;
DOFILE RPJOB=P_RPJOB;
DOFILE RPJOTM=P_RPJOTM;
DOFILE RPCG=P_RPCG;
DOFILE RPXOG=P_RPXOG;
DOFILE RPXPR=P_RPXPR;
DOFILE RPXPS=P_RPXPS;
DOFILE RPXX=P_RPXX;

/* MULTI is now the current working model. We want to change to the main model.
usemod im95;
```

5. The models

5.1. Introduction

The Implementation Model system consist, in fact, of three models. The main model and two minor sub-models used to calculate the residuals. One of the sub-model (ADDIT) is used to calculate the additive residuals, while the other (MULTI) is used to calculate, or actually simulate, the multiplicative residuals.

In this chapter the models are represented by the input files generating them.

5.1.1. Im95.inp

```
option screen off;

/* Input file IM95.INP.

/* This input file is used for generating the main model, IM95.DAT. This input file will be executed
/* automatically by the DATABANK.INP file, but can also be executed separately.

/* In some cases it will be preferable to run only this file. Therefore it must have it's own access and search
/* commands. It also must have a delaccess and delsearch command to delete eventually accesses and searches /*
given earlier.

delaccess all;
delsearch all;

input accessim;
input srchtime;

usemod im95;
modedit;
deleq all;
delsym all;
addeq top,


/* Private consumption.
```

```
/* Total consumption by residents.

/* Equation 1
LOG(CPR) - LOG(CPR( - 1)) =
CPR.1 + CPR.2 * (LOG((HR * (1 - THR)) / PCPR) - LOG((HR( - 1) * (1 - THR( - 1))) / PCPR( - 1))) +
CPR.3 * (LOG(CPR( - 1)) - LOG((HR( - 1) * (1 - THR( - 1)) / PCPR( - 1)))) + CPR.4 * (LOG(CPR( - 1)) -
LOG(HW( - 2) / PCPR( - 2))) + CPR.5 * (POIL / PCPR) + CPR.6 * D9091 + RCPR,

/* Equation 2
VCPR =
PCPFOO * CPRFOO + PCPCLO * CPRCLO + PCPREN * CPRREN + PCPFUR * CPRFUR +
PCPMED * CPRMED + PCPTRA * CPRTRA + PCPENT * CPRENT + PCPOTH * CPROTH +
PCPABR * CPRABR + RVCPR,

/* Linear expenditure system.

/* Equation 3
CPRFOO =
CPRFOO.1 + (CPRFOO.2 / PCPFOO) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRFOO,

/* Equation 4
CPRCLO =
CPRCLO.1 + (CPRCLO.2 / PCPCLO) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRCLO,

/* Equation 5
CPRREN =
CPRREN.1 + (CPRREN.2 / PCPREN) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRREN,

/* Equation 6
CPRFUR =
CPRFUR.1 + (CPRFUR.2 / PCPFUR) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRFUR,

/* Equation 7
CPRMED =
CPRMED.1 + (CPRMED.2 / PCPMED) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRMED,

/* Equation 8
CPRTRA =
CPRTRA.1 + (CPRTRA.2 / PCPTRA) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRTRA,

/* Equation 9
CPRENT =
CPRENT.1 + (CPRENT.2 / PCPENT) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPRENT,
```

```
/* Equation 10
CPROTH =
CPROTH.1 + (CPROTH.2 / PCPOTH) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO +
CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA +
CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)) + RCPROTH,

/* Equation 11
CPRABR =
CPR - (CPRFOO + CPRCLO + CPRREN + CPRFUR + CPRMED + CPRTRA + CPRENT + CPROTH),

/* Total private consumption by object of expenditure.

/* Equation 12
CPFOO = CPRFOO + 0.07 * CPN,

/* Equation 13
CPCLO = CPRCLO + 0.06 * CPN,

/* Equation 14
CPREN = CPRREN ,

/* Equation 15
CPFUR = CPRFUR + 0.22 * CPN,

/* Equation 16
CPMED = CPRMED,

/* Equation 17
CPTRA = CPRTRA + 0.01 * CPN,

/* Equation 18
CPENT = CPRENT,

/* Equation 19
CPOTH = CPROTH + 0.64 * CPN,

/* Equation 20
CPABR = CPRABR ,

/* Total private consumption.

/* Equation 21
VCP = VCPR + VCPN ,

/* Equation 22
CP = CPR + CPN ,

/* Equation 23
PCP = VCP / CP ,

/* Government consumption.

/* Equation 24
VCG = CG * PCG,

/* Gross fixed capital formation.
/* Non - oil private residential building.
```

```
/* Equation 25
LOG(JPH) - LOG(JPH( - 1)) =
JPH.1 + JPH.2 * (LOG(ICH / PJPH) - LOG(ICH( - 1) / PJPH( - 1))) + JPH.3 * LOG(ICH( - 1) / (PJPH( - 1))) +
JPH.4 * LOG(HR( - 1) / PJPH( - 1)) + JPH.5 * LOG(JPH( - 1)) + RJPH,

/* Non - oil private non - residential building.

/* Equation 26
LOG(JPB) - LOG(JPB( - 1)) =
JPB.1 + JPB.2 * (LOG(ICB / PJPB) - LOG(ICB( - 1) / PJPB( - 1))) +
JPB.3 * LOG(VYSC( - 1) / PJPB( - 1)) + JPB.4 * LOG(JPB( - 1)) + RJPB,

/* Non - oil private, transport and machinery equipment.

/* Equation 27
LOG(JPTM) - LOG(JPTM( - 1)) =
JPTM.1 + JPTM.2 * (LOG(JPTM( - 1)) - LOG(JPTM( - 2))) + JPTM.3 * (LOG(ICTM / PJPTM) -
LOG(ICTM( - 1) / PJPTM( - 1))) + JPTM.4 * LOG(ICTM( - 1) / PJPTM( - 1)) +
JPTM.5 * LOG(VYSC( - 1) / PJPTM( - 1)) + JPTM.6 * LOG(JPTM( - 1)) + RJPTM,

/* Equation 28
JP = JPH + JPB + JPTM ,

/* Equation 29
JG = JGB + JGTM,

/* Equation 30
JO = JOB + JOTM,

/* Equation 31
J = JP + JG + JO,

/* Equation 32
VJP = PJPH * JPH + PJPB * JPB + PJPTM * JPTM,

/* Equation 33
VJG = PJGB * JGB + PJGTM * JGTM,

/* Equation 34
VJO = PJOB * JOB + PJOTM * JOTM,

/* Equation 35
VJ = VJP + VJG + VJO,

/* Capital stock.

/* Equation 36
KP - KP( - 1) = JP - DKP,

/* Equation 37
DKP = DKPRATE * KP( - 1),

/* Domestic absorption.

/* Equation 38
DA = CP + CG + J + DS,
```

```
/* Exports.

/* Equation 39
X = XOG + XPR + XPS + XX + CPN ,

/* Equation 40
VX = VXOG + VXPR + VXPS + VXX + VCPN ,

/* Equation 41
VXOG = PXOG * XOG,

/* Equation 42
VXPR = PXPR * XPR,

/* Equation 43
VXPS = PXPS * XPS,

/* Equation 44
VXX = PXX * XX ,

/* Equation 45
VCPN = PCPN * CPN ,

/* Imports.

/* Equation 46
M =
MS *(A.M.CPFOO * CPFOO + A.M.CPCLO * CPCLO + A.M.CPREN * CPREN + A.M.CPFUR * CPFUR +
A.M.CPMED * CPMED + A.M.CPTRA * CPTRA + A.M.CPENT * CPENT + A.M.CPOTH * CPOTH +
A.M.CPABR * CPABR + A.M.JPH * JPH + A.M.JPB * JPB + A.M.JPTM * JPTM + A.M.JGB * JGB +
A.M.JGTM * JGTM + A.M.JOB * JOB + A.M.JOTM * JOTM + A.M.CG * CG + A.M.DS * DS +
A.M.XOG * XOG + A.M.XPR * XPR + A.M.XPS * XPS + A.M.XX * XX) + (1 - (RYAG + RYPS + RYMA +
RYEW + RYCN + RYTD + RYTC + RYRE + RYFI + RYCS + RYGS + RYBC + RYOG + RYPR + RYID)),

/* Equation 47
VM = PM * M,

/* Production by sector.

/* Agriculture, forestry and fishing.
/* Equation 48
YAG =
A.AG.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.AG.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.AG.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.AG.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.AG.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.AG.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.AG.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.AG.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.AG.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.AG.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.AG.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.AG.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.AG.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.AG.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.AG.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.AG.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
```

```
A.AG.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.AG.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.AG.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.AG.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.AG.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.AG.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYAG,

/* Other mining, quarrying.

/* Equation 49
YMI =
A.MI.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.MI.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.MI.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.MI.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.MI.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.MI.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.MI.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.MI.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.MI.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.MI.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.MI.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.MI.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.MI.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.MI.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.MI.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.MI.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.MI.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.MI.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.MI.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.MI.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.MI.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.MI.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYMI,

/* Petrochemicals.
/* Equation 50
YPS =
A.PS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.PS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.PS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.PS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.PS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.PS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.PS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.PS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.PS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.PS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.PS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.PS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.PS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.PS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.PS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.PS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.PS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.PS.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.PS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.PS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.PS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
```

```
A.PS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYPS,

/* Other manufactering.
/* Equation 51
YMA =
A.MA.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.MA.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.MA.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.MA.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.MA.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.MA.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.MA.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.MA.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.MA.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.MA.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.MA.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.MA.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.MA.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.MA.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.MA.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.MA.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.MA.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.MA.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.MA.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.MA.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.MA.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.MA.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYMA,

/* Electricity, gas and water.
/* Equation 52
YEW =
A.EW.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.EW.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.EW.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.EW.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.EW.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.EW.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.EW.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.EW.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.EW.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.EW.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.EW.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.EW.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.EW.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.EW.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.EW.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.EW.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.EW.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.EW.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.EW.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.EW.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.EW.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.EW.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYEW,

/* Construction.
/* Equation 53
YCN =
A.CN.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
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A.CN.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.CN.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.CN.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.CN.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.CN.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.CN.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.CN.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.CN.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.CN.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.CN.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.CN.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.CN.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.CN.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.CN.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.CN.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.CN.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.CN.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.CN.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.CN.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.CN.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.CN.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYCN,

/* Wholesale and retail trade.
/* Equation 54
YTD =
A.TD.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.TD.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.TD.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.TD.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.TD.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.TD.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.TD.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.TD.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.TD.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.TD.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.TD.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.TD.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.TD.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.TD.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.TD.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.TD.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.TD.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.TD.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.TD.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.TD.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.TD.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.TD.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYTD,

/* Transport and communication.
/* Equation 55
YTC =
A.TC.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.TC.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.TC.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.TC.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.TC.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.TC.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.TC.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
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A.TC.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.TC.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.TC.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.TC.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.TC.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.TC.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.TC.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.TC.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.TC.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.TC.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.TC.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.TC.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.TC.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.TC.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.TC.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYTC,

/* Real estate.
/* Equation 56
YRE =
A.RE.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.RE.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.RE.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.RE.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.RE.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.RE.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.RE.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.RE.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.RE.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.RE.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.RE.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.RE.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.RE.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.RE.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.RE.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.RE.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.RE.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.RE.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.RE.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.RE.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.RE.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.RE.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYRE,

/* Finance, insurance.
/* Equation 57
YFI =
A.FI.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.FI.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.FI.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.FI.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.FI.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.FI.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.FI.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.FI.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.FI.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.FI.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.FI.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.FI.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.FI.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
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A.FI.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.FI.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.FI.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.FI.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.FI.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.FI.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.FI.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.FI.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.FI.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYFI,

/* Community services.
/* Equation 58
YCS =
A.CS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.CS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.CS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.CS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.CS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.CS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.CS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.CS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.CS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.CS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.CS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.CS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.CS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.CS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.CS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.CS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.CS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.CS.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.CS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.CS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.CS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.CS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYCS,

/* Government services.
/* Equation 59
YGS =
A.GS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.GS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.GS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.GS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.GS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.GS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.GS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.GS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.GS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.GS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.GS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.GS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.GS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.GS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.GS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.GS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.GS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.GS.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.GS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
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A.GS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.GS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.GS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYGS,

/* Imputed bank charges.
/* Equation 60
YBC =
A.BC.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.BC.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.BC.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.BC.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.BC.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.BC.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.BC.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.BC.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.BC.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.BC.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.BC.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.BC.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.BC.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.BC.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.BC.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.BC.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.BC.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.BC.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.BC.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.BC.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.BC.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.BC.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYBC,

/* Crude oil and natural gas.
/* Equation 61
YOG =
A.OG.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.OG.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.OG.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.OG.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.OG.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.OG.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.OG.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.OG.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.OG.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.OG.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.OG.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.OG.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.OG.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.OG.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.OG.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.OG.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.OG.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.OG.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.OG.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.OG.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.OG.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.OG.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYOG,

/* Petroleum refining.
/* Equation 62
```

```
YPR =
A.PR.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.PR.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.PR.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.PR.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.PR.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.PR.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.PR.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.PR.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.PR.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.PR.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.PR.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.PR.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.PR.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.PR.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.PR.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.PR.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.PR.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.PR.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.PR.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.PR.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.PR.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.PR.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYPR,

/* Import duties.
/* Equation 63
YID =
A.ID.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * CPFOO +
A.ID.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * CPCLO +
A.ID.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * CPREN +
A.ID.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * CPFUR +
A.ID.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * CPMED +
A.ID.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * CPTRA +
A.ID.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * CPENT +
A.ID.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * CPOTH +
A.ID.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * CPABR +
A.ID.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * JPH +
A.ID.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * JPB +
A.ID.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * JPTM +
A.ID.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * JGB +
A.ID.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * JGTM +
A.ID.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * JOB +
A.ID.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * JOTM +
A.ID.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * CG +
A.ID.DS * (1 - MS * A.M.DS) / (1 - A.M.DS) * DS +
A.ID.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * XOG +
A.ID.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * XPR +
A.ID.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * XPS +
A.ID.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * XX + RYID,

/* Equation 64
YP = YAG + YMI + YPS + YMA + YEW + YCN + YTD + YTC + YRE + YFI + YCS + YBC,

/* Equation 65
VYP =
PYAG * YAG + PYMI * YMI + PYPS * YPS + PYMA * YMA + PYEW * YEW + PYCN * YCN +
PYTD * YTD + PYTC * YTC + PYRE * YRE + PYFI * YFI + PYCS * YCS + PYBC * YBC ,
```

```
/* Equation 66
YO = YOG + YPR ,
/* Equation 67
YG = YGS ,

/* Equation 68
Y = YP + YO + YG + YID,

/* Equation 69
VYG = PYG * YG ,

/* Equation 70
VYID = PYID * YID,

/* Equation 71
VY = VYP + VYOG + VYPR + VYG + VYID,

/* Employment.

/* Equation 72
LOG(EP) - LOG(EP( - 1)) =
EP.1 + EP.2 * (LOG(EP( - 1)) - LOG(EP( - 2))) + EP.3 * (LOG(EP( - 1)) - LOG(YP( - 1))) +
EP.4 * LOG(KP( - 2)) + REP,

/* Equation 73
ESP = EP - ENP,

/* Equation 74
ESG = EG - ENG,

/* Equation 75
EG = YG / QG ,

/* Equation 76
E = EP + EG,

/* Equation 77
ES = ESP + ESG,

/* Equation 78
EN = ENP + ENG,

/* Equation 79
LS = LSW + LSM,

/* Equation 80
US = LS - ES ,

/* Productivity.

/* Equation 81
QP = YP / EP,

/* Wage rates in private non-oil sector.

/* Equation 82
LOG(WP / PCP) - LOG(WP( - 1) / PCP( - 1)) =
WP.1 + WP.2 * (LOG(QP) - LOG(QP( - 1))) + WP.3 * (LOG(WP( - 1) / PCP( - 1)) - LOG(QP( - 1))) +
```

```
WP.4 * LOG(WG( - 1)) + WP.5 * D9091 + RWP,

/* Wage costs.

/* Equation 83
VYWP = WP * EP,

/* Equation 84
VYWG = WG * EG,

/* Equation 85
VYW = VYWP + VYWG + VYWO,

/* Household disposable income and wealth.

/* Equation 86
HR = VYW + VYSH + GESS,

/* Equation 87
HW = M2 - M0 - LIABP,

/* Sector factorprices.

/* Equation 88
LOG(PYFAG) - LOG(PYFAG( - 1)) =
PYFAG.1 + PYFAG.2 * (LOG(WP) - LOG(WP( - 1))) + PYFAG.3 * ( LOG(PYFAG( - 1)) - LOG(WP( - 1))) +
RPYFAG,

/* Equation 89
LOG(PYFMI) - LOG(PYFMI( - 1)) =
PYFMI.1 + PYFMI.2 * (LOG(WP) - LOG(WP( - 1))) + PYFMI.3 * ( LOG(PYFMI( - 1)) - LOG(WP( - 1))) +
RPYFMI,

/* Equation 90
LOG(PYFMA) - LOG(PYFMA( - 1)) =
PYFMA.1 + PYFMA.2 * (LOG(WP) - LOG(WP( - 1))) + PYFMA.3 * (LOG(PM) - LOG(PM( - 1))) +
PYFMA.4 * (LOG(PYFMA( - 1)) - LOG(WP( - 1))) + PYFMA.5 * (LOG(PYFMA( - 1)) - LOG(PM( - 1))) +
RPYFMA,

/* Equation 91
LOG(PYFCN) - LOG(PYFCN( - 1)) =
PYFCN.1 + PYFCN.2 * (LOG(WP) - LOG(WP( - 1))) + PYFCN.3 * (LOG(PM) - LOG(PM( - 1))) +
PYFCN.4 * (LOG(PYFCN( - 1)) - LOG(WP( - 1))) + PYFCN.5 * (LOG(PYFCN( - 1)) - LOG(PM( - 1))) +
RPYFCN,

/* Equation 92
LOG(PYFTD) - LOG(PYFTD( - 1)) =
PYFTD.1 + PYFTD.2 * (LOG(WP) - LOG(WP( - 1))) + PYFTD.3 * (LOG(PM) - LOG(PM( - 1))) +
PYFTD.4 * (LOG(PYFTD( - 1)) - LOG(WP( - 1))) + RPYFTD,

/* Equation 93
LOG(PYFTC) - LOG(PYFTC( - 1)) =
PYFTC.1 + PYFTC.2 * (LOG(WP) - LOG(WP( - 1))) + PYFTC.3 * (LOG(PM) - LOG(PM( - 1))) +
PYFTC.4 * (LOG(PYFTC( - 1)) - LOG(WP( - 1))) + RPYFTC,

/* Equation 94
LOG(PYFCS) - LOG(PYFCS( - 1)) =
PYFCS.1 + PYFCS.2 * (LOG(WP) - LOG(WP( - 1))) + PYFCS.3 * (LOG(PM) - LOG(PM( - 1))) +
```

```
PYFCS.4 * (LOG(PYFCS( - 1)) - LOG(WP( - 1))) + RPYFCS,

/* Equation 95
LOG(PYFGS) - LOG(PYFGS( - 1)) =
PYFGS.1 + PYFGS.2 * (LOG(WG) - LOG(WG( - 1))) + PYFGS.3 * ( LOG(PYFGS( - 1)) - LOG(WG( - 1))) +
RPYFGS,

/* Sector prices including net indirect taxes.

/* Equation 96
PYAG = ((1 - TAG.0) / (1 - TAG)) * PYFAG,

/* Equation 97
PYMI = ((1 - TMI.0) / (1 - TMI)) * PYFMI,

/* Equation 98
PYMA = ((1 - TMA.0) / (1 - TMA)) * PYFMA,

/* Equation 99
PYCN = ((1 - TCN.0) / (1 - TCN)) * PYFCN,

/* Equation 100
PYTD = ((1 - TTD.0) / (1 - TTD)) * PYFTD,

/* Equation 101
PYTC = ((1 - TTC.0) / (1 - TTC)) * PYFTC,

/* Equation 102
PYCS = ((1 - TCS.0) / (1 - TCS)) * PYFCS,
2
/* Equation 103
PYGS = ((1 - TGS.0) / (1 - TGS)) * PYFGS,

/* Equation 104
PYPS = ((1 - TPS.0) / (1 - TPS)) * PYFPS,

/* Equation 105
PYEW = ((1 - TEW.0) / (1 - TEW)) * PYFEW,

/* Equation 106
PYRE = ((1 - TRE.0) / (1 - TRE)) * PYFRE,

/* Equation 107
PYFI = ((1 - TFI.0) / (1 - TFI)) * PYFFI,

/* Equation 108
PYBC = ((1 - TBC.0) / (1 - TBC)) * PYFBC,

/* Equation 109
PYPR = ((1 - TPR.0) / (1 - TPR)) * PYFPR,

/* Equation 110
PYOG = ((1 - TOG.0) / (1 - TOG)) * PYFOG,


/* Equation 111
PYP = VYP / YP,
```

```
/* Final demand prices.

/* Food,beverages and tobacco.
/* Equation 112
PCPFOO =
(MS * A.M.CPFOO * PM +
A.AG.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYAG +
A.MI.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYMI +
A.PS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYPS +
A.MA.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYMA +
A.EW.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYEW +
A.CN.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYCN +
A.TD.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYTD +
A.TC.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYTC +
A.RE.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYRE +
A.FI.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYFI +
A.CS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYCS +
A.GS.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYGS +
A.BC.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYBC +
A.OG.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYOG +
A.PR.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYPR +
A.ID.CPFOO * (1 - MS * A.M.CPFOO) / (1 - A.M.CPFOO) * PYID) * RPCPFOO ,

/* Clothing and footware.
/* Equation 113
PCPCLO =
(MS * A.M.CPCLO * PM +
A.AG.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYAG +
A.MI.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYMI +
A.PS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYPS +
A.MA.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYMA +
A.EW.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYEW +
A.CN.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYCN +
A.TD.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYTD +
A.TC.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYTC +
A.RE.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYRE +
A.FI.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYFI +
A.CS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYCS +
A.GS.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYGS +
A.BC.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYBC +
A.OG.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYOG +
A.PR.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYPR +
A.ID.CPCLO * (1 - MS * A.M.CPCLO) / (1 - A.M.CPCLO) * PYID) * RPCPCLO ,

/* Rent, fuel and power.
/* Equation 114
PCPREN =
(MS * A.M.CPREN * PM +
A.AG.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYAG +
A.MI.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYMI +
A.PS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYPS +
A.MA.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYMA +
A.EW.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYEW +
A.CN.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYCN +
A.TD.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYTD +
A.TC.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYTC +
A.RE.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYRE +
A.FI.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYFI +
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A.CS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYCS +
A.GS.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYGS +
A.BC.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYBC +
A.OG.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYOG +
A.PR.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYPR +
A.ID.CPREN * (1 - MS * A.M.CPREN) / (1 - A.M.CPREN) * PYID) * RPCPREN ,

/* Furniture and household equipment.
/* Equation 115
PCPFUR =
(MS * A.M.CPFUR * PM +
A.AG.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYAG +
A.MI.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYMI +
A.PS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYPS +
A.MA.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYMA +
A.EW.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYEW +
A.CN.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYCN +
A.TD.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYTD +
A.TC.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYTC +
A.RE.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYRE +
A.FI.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYFI +
A.CS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYCS +
A.GS.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYGS +
A.BC.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYBC +
A.OG.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYOG +
A.PR.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYPR +
A.ID.CPFUR * (1 - MS * A.M.CPFUR) / (1 - A.M.CPFUR) * PYID) * RPCPFUR ,

/* Medical helth care
/* Equation 116
PCPMED =
(MS * A.M.CPMED * PM +
A.AG.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYAG +
A.MI.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYMI +
A.PS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYPS +
A.MA.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYMA +
A.EW.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYEW +
A.CN.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYCN +
A.TD.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYTD +
A.TC.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYTC +
A.RE.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYRE +
A.FI.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYFI +
A.CS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYCS +
A.GS.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYGS +
A.BC.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYBC +
A.OG.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYOG +
A.PR.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYPR +
A.ID.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYID) * RPCPMED ,

/* Transport and communication.

/* Equation 117
PCPTRA =
(MS * A.M.CPTRA * PM +
A.AG.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYAG +
A.MI.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYMI +
A.PS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYPS +
A.MA.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYMA +
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A.EW.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYEW +
A.CN.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYCN +
A.TD.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYTD +
A.TC.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYTC +
A.RE.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYRE +
A.FI.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYFI +
A.CS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYCS +
A.GS.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYGS +
A.BC.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYBC +
A.OG.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYOG +
A.PR.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYPR +
A.ID.CPTRA * (1 - MS * A.M.CPTRA) / (1 - A.M.CPTRA) * PYID) * RPCPTRA ,

/* Entertainment and education.
/* Equation 118
PCPENT =
(MS * A.M.CPENT * PM +
A.AG.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYAG +
A.MI.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYMI +
A.PS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYPS +
A.MA.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYMA +
A.EW.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYEW +
A.CN.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYCN +
A.TD.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYTD +
A.TC.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYTC +
A.RE.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYRE +
A.FI.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYFI +
A.CS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYCS +
A.GS.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYGS +
A.BC.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYBC +
A.OG.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYOG +
A.PR.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYPR +
A.ID.CPENT * (1 - MS * A.M.CPENT) / (1 - A.M.CPENT) * PYID) * RPCPENT ,

/* Other goods and services.
/* Equation 119
PCPOTH =
(MS * A.M.CPOTH * PM +
A.AG.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYAG +
A.MI.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYMI +
A.PS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYPS +
A.MA.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYMA +
A.EW.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYEW +
A.CN.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYCN +
A.TD.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYTD +
A.TC.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYTC +
A.RE.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYRE +
A.FI.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYFI +
A.CS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYCS +
A.GS.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYGS +
A.BC.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYBC +
A.OG.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYOG +
A.PR.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYPR +
A.ID.CPOTH * (1 - MS * A.M.CPOTH) / (1 - A.M.CPOTH) * PYID) * RPCPOTH ,

/* Resident direct purchase abroad.
/* Equation 120
PCPABR =
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(MS * A.M.CPABR * PM +
A.AG.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYAG +
A.MI.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYMI +
A.PS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYPS +
A.MA.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYMA +
A.EW.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYEW +
A.CN.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYCN +
A.TD.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYTD +
A.TC.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYTC +
A.RE.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYRE +
A.FI.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYFI +
A.CS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYCS +
A.GS.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYGS +
A.BC.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYBC +
A.OG.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYOG +
A.PR.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYPR +
A.ID.CPABR * (1 - MS * A.M.CPABR) / (1 - A.M.CPABR) * PYID ) * RPCPABR,

/* Total resident.
/* Equation 121
PCPR = VCPR / CPR ,

/* Private non-oil, residential building.
/* Equation 122
PJPH =
(MS * A.M.JPH * PM +
A.AG.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYAG +
A.MI.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYMI +
A.PS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYPS +
A.MA.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYMA +
A.EW.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYEW +
A.CN.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYCN +
A.TD.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYTD +
A.TC.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYTC +
A.RE.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYRE +
A.FI.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYFI +
A.CS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYCS +
A.GS.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYGS +
A.BC.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYBC +
A.OG.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYOG +
A.PR.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYPR +
A.ID.JPH * (1 - MS * A.M.JPH) / (1 - A.M.JPH) * PYID) * RPJPH ,

/* Private non-oil, non-residential building.
/* Equation 123
PJPB =
(MS * A.M.JPB * PM +
A.AG.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYAG +
A.MI.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYMI +
A.PS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYPS +
A.MA.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYMA +
A.EW.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYEW +
A.CN.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYCN +
A.TD.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYTD +
A.TC.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYTC +
A.RE.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYRE +
A.FI.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYFI +
A.CS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYCS +
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A.GS.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYGS +
A.BC.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYBC +
A.OG.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYOG +
A.PR.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYPR +
A.ID.JPB * (1 - MS * A.M.JPB) / (1 - A.M.JPB) * PYID) * RPJPB ,

/* Private non-oil, transport and machinery equipment.
/* Equation 124.
PJPTM =
(MS * A.M.JPTM * PM +
A.AG.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYAG +
A.MI.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYMI +
A.PS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYPS +
A.MA.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYMA +
A.EW.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYEW +
A.CN.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYCN +
A.TD.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYTD +
A.TC.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYTC +
A.RE.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYRE +
A.FI.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYFI +
A.CS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYCS +
A.GS.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYGS +
A.BC.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYBC +
A.OG.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYOG +
A.PR.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYPR +
A.ID.JPTM * (1 - MS * A.M.JPTM) / (1 - A.M.JPTM) * PYID) * RPJPTM ,

/* Government investment, non-residential building.
/* Equation 125
PJGB =
(MS * A.M.JGB * PM +
A.AG.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYAG +
A.MI.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYMI +
A.PS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYPS +
A.MA.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYMA +
A.EW.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYEW +
A.CN.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYCN +
A.TD.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYTD +
A.TC.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYTC +
A.RE.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYRE +
A.FI.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYFI +
A.CS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYCS +
A.GS.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYGS +
A.BC.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYBC +
A.OG.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYOG +
A.PR.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYPR +
A.ID.JGB * (1 - MS * A.M.JGB) / (1 - A.M.JGB) * PYID) * RPJGB ,

/* Government investment, transport and machinery equipment.
/* Equation 126
PJGTM =
(MS * A.M.JGTM * PM +
A.AG.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYAG +
A.MI.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYMI +
A.PS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYPS +
A.MA.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYMA +
A.EW.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYEW +
A.CN.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYCN +
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A.TD.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYTD +
A.TC.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYTC +
A.RE.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYRE +
A.FI.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYFI +
A.CS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYCS +
A.GS.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYGS +
A.BC.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYBC +
A.OG.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYOG +
A.PR.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYPR +
A.ID.JGTM * (1 - MS * A.M.JGTM) / (1 - A.M.JGTM) * PYID) * RPJGTM ,

/* Oil-sector investment, non-residential building.
/* Equation 127
PJOB =
(MS * A.M.JOB * PM +
A.AG.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYAG +
A.MI.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYMI +
A.PS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYPS +
A.MA.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYMA +
A.EW.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYEW +
A.CN.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYCN +
A.TD.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYTD +
A.TC.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYTC +
A.RE.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYRE +
A.FI.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYFI +
A.CS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYCS +
A.GS.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYGS +
A.BC.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYBC +
A.OG.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYOG +
A.PR.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYPR +
A.ID.JOB * (1 - MS * A.M.JOB) / (1 - A.M.JOB) * PYID) * RPJOB ,

/* Oil-sector investment, transport and machinery equipment.
/* Equation 128
PJOTM =
(MS * A.M.JOTM * PM +
A.AG.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYAG +
A.MI.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYMI +
A.PS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYPS +
A.MA.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYMA +
A.EW.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYEW +
A.CN.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYCN +
A.TD.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYTD +
A.TC.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYTC +
A.RE.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYRE +
A.FI.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYFI +
A.CS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYCS +
A.GS.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYGS +
A.BC.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYBC +
A.OG.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYOG +
A.PR.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYPR +
A.ID.JOTM * (1 - MS * A.M.JOTM) / (1 - A.M.JOTM) * PYID) * RPJOTM ,

/* Government final consumption.
/* Equatio 129
PCG =
(MS * A.M.CG * PM +
A.AG.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYAG +
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A.MI.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYMI +
A.PS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYPS +
A.MA.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYMA +
A.EW.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYEW +
A.CN.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYCN +
A.TD.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYTD +
A.TC.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYTC +
A.RE.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYRE +
A.FI.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYFI +
A.CS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYCS +
A.GS.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYGS +
A.BC.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYBC +
A.OG.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYOG +
A.PR.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYPR +
A.ID.CG * (1 - MS * A.M.CG) / (1 - A.M.CG) * PYID ) * RPCG,

/* Increase in stocks.
/* Equation 130
PDS = (VY + VM - VCP - VCG - VJ - VX ) / DS,

/* Exports of oil and gas.
/* Equation 131
PXOG =
(MS * A.M.XOG * PM +
A.AG.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYAG +
A.MI.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYMI +
A.PS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYPS +
A.MA.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYMA +
A.EW.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYEW +
A.CN.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYCN +
A.TD.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYTD +
A.TC.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYTC +
A.RE.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYRE +
A.FI.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYFI +
A.CS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYCS +
A.GS.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYGS +
A.BC.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYBC +
A.OG.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYOG +
A.PR.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYPR +
A.ID.XOG * (1 - MS * A.M.XOG) / (1 - A.M.XOG) * PYID) * RPXOG ,

/* Exports of refined products.
/* Equation 132
PXPR =
(MS * A.M.XPR * PM +
A.AG.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYAG +
A.MI.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYMI +
A.PS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYPS +
A.MA.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYMA +
A.EW.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYEW +
A.CN.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYCN +
A.TD.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYTD +
A.TC.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYTC +
A.RE.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYRE +
A.FI.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYFI +
A.CS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYCS +
A.GS.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYGS +
A.BC.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYBC +
```

```
A.OG.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYOG +
A.PR.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYPR +
A.ID.XPR * (1 - MS * A.M.XPR) / (1 - A.M.XPR) * PYID) * RPXPR ,

/* Exports of petrochemicals.
/* Equation 133
PXPS =
(MS * A.M.XPS * PM +
A.AG.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYAG +
A.MI.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYMI +
A.PS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYPS +
A.MA.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYMA +
A.EW.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYEW +
A.CN.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYCN +
A.TD.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYTD +
A.TC.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYTC +
A.RE.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYRE +
A.FI.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYFI +
A.CS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYCS +
A.GS.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYGS +
A.BC.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYBC +
A.OG.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYOG +
A.PR.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYPR +
A.ID.XPS * (1 - MS * A.M.XPS) / (1 - A.M.XPS) * PYID) * RPXPS ,

/* Exports of goods and services, less export of oil, gas, petrochemicals,
/* refined products and non-resident direct purchase
/* Equation 134
PXX =
(MS * A.M.XX * PM +
A.AG.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYAG +
A.MI.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYMI +
A.PS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYPS +
A.MA.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYMA +
A.EW.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYEW +
A.CN.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYCN +
A.TD.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYTD +
A.TC.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYTC +
A.RE.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYRE +
A.FI.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYFI +
A.CS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYCS +
A.GS.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYGS +
A.BC.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYBC +
A.OG.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYOG +
A.PR.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYPR +
A.ID.XX * (1 - MS * A.M.XX) / (1 - A.M.XX) * PYID) * RPXX ,

/* Non-resident direct purchase.

/* Equation 135
PCPN = 0.07 * PCPFOO + 0.06 * PCPCLO + 0.22 * PCPFUR + 0.01 * PCPTRA + 0.64 * PCPOTH + RPCPN,

/* Value of sectoral production.

/* Equation 136
VYAG = PYAG * YAG,

/* Equation 137
```

```
VYMI = PYMI * YMI,

/* Equation 138
VYPS = PYPS * YPS,

/* Equation 139
VYMA = PYMA * YMA,

/* Equation 140
VYEW = PYEW * YEW,

/* Equation 141
VYCN = PYCN * YCN,

/* Equation 142
VYTD = PYTD * YTD,

/* Equation 143
VYTC = PYTC * YTC,

/* Equation 144
VYRE = PYRE * YRE,

/* Equation 145
VYFI = PYFI * YFI,

/* Equation 146
VYCS = PYCS * YCS,

/* Equation 147
VYBC = PYBC * YBC,

/* Equation 148
VYPR = PYPR * YPR,

/* Equation 149
VYOG = PYOG * YOG,

/* Net indirect taxes.

/* Equation 150
VYTAG = VYAG - PYFAG * (1 - TAG.0) * YAG ,

/* Equation 151
VYTMI = VYMI - PYFMI * (1 - TMI.0) * YMI ,

/* Equation 152
VYTPS = VYPS - PYFPS * (1 - TPS.0) * YPS ,

/* Equation 153
VYTMA = VYMA - PYFMA * (1 - TMA.0) * YMA ,

/* Equation 154
VYTEW = VYEW - PYFEW * (1 - TEW.0) * YEW ,

/* Equation 155
VYTCN = VYCN - PYFCN * (1 - TCN.0) * YCN ,
```

```
/* Equation 156
VYTTD = VYTD - PYFTD * (1 - TTD.0) * YTD ,
/* Equation 157
VYTTC = VYTC - PYFTC * (1 - TTC.0) * YTC ,

/* Equation 158
VYTRE = VYRE - PYFRE * (1 - TRE.0) * YRE ,

/* Equation 159
VYTFI = VYFI - PYFFI * (1 - TFI.0) * YFI ,

/* Equation 160
VYTCS = VYCS - PYFCS * (1 - TCS.0) * YCS ,

/* Equation 161
VYTBC = VYBC - PYFBC * (1 - TBC.0) * YBC ,

/* Equation 162
VYTPR = VYPR - PYFPR * (1 - TPR.0) * YPR ,

/* Equation 163
VYTOG = VYOG - PYFOG * (1 - TOG.0) * YOG ,

/* Equation 164
VYTP =
VYTAG + VYTMI + VYTPS + VYTMA + VYTEW + VYTCN + VYTTD + VYTTC + VYTRE + VYTFI +
VYTCS + VYTBC ,

/* Equation 165
VYT = VYTP + VYTOG + VYTPR ,

/* Gross operating surplus.

/* Private, total.

/* Equation 166
VYSP = VYP - VYTP - WP * EP,

/* Household share.

/* Equation 167
VYSH = VYSSHARE * VYSP,

/* Company share.

/* Equation 168
VYSC = (1 - VYSSHARE) * VYSP,

/* Equation 169
VYSO = VYSOG + VYSPR,

/* Current account balance.

/* Equation 170
Z = VX - VM + ZR,

/* Government budget.
```

```
/* Equation 171
GECH12 = VYWG + RGECH12,
/* Equation 172
GECH3 = GESS - VYT + RGECH3,

/* Equation 173
GECH4 = VJG + RGECH4,

/* Equation 174
GROTH = VYID + RGROTH,

/* Equation 175
GROIL = GROSHARE * VYSO,

/* Equation 176
ZG = GROIL + GROTH + THR * HR - GECH12 - GECH3 - GECH4,

/* Private sector net financial investment.

/* Equation 177
ZP = Z - ZG;

CHANGESYM ENDOGENOUS
GECH12 GECH3 GECH4 GROIL GROTHYAG YMI YPS YMA YEW YCN YTD YTC YRE YFI YCS YGS
YBC XOG XPR YID PCPFOO PCPCLO PCPREN PCPFUR PCPMED PCPTRA PCPENT PCPOTH PCPABR
PCPN PJPH PJPB PJPTM PJGB PJGTM PJOB PJOTM PCG PXOG PXPR PXPS PXX PDS PCPR PYP CPR
CP VCP CPFOO CPCLO CPREN CPFUR CPMED CPTRA CPENT CPOTH CPABR VCPR CPRABR
CPRFOO CPRCLO CPRREN CPRFUR CPRMED CPRTRA CPRENT CPROTH JP JG JO JPH JPB JPTM J
DA M VM YP YO YG Y KP DKP ES EN EP ESP EG ESG E LS US QP VYSO VYT VYTP VYTAG VYTMI
VYTPS VYTMA VYTEW VYTCN VYTTD VYTTC VYTRE VYTFI VYTCS VYTBC VYTPR VYTOG
VYSC VYSH VYAG VYMI VYPS VYMA VYEW VYCN VYTD VYTC VYRE VYFI VYCS VYBC VYPR
VYOG VYID VYG VCG VY VJ VJP VJG VJO VYP VYWP VYWG VYW HR HW VYSP VX VCPN VXOG
VXPR VXPS VXX WP X Z ZG ZP PYAG PYMI PYGS PYCS PYTD PYTC PYMA PYCN PYPS PYEW
PYRE PYFI PYBC PYPR PYOG PYFAG PYFMI PYFGS PYFCS PYFTD PYFTC PYFMA PYFCN PCP;

CHANGESYM COEFFICIENT
CPR.1 CPR.2 CPR.3 CPR.4 CPR.5 CPR.6 CPRFOO.1 CPRFOO.2 CPRCLO.1 CPRCLO.2 CPRREN.1
CPRREN.2 CPRFUR.1 CPRFUR.2 CPRMED.1 CPRMED.2 CPRTRA.1 CPRTRA.2 CPRENT.1 CPRENT.2
CPROTH.1 CPROTH.2 CPRABR.1 JPH.1 JPH.2 JPH.3 JPH.4 JPH.5 JPB.1 JPB.2 JPB.3 JPB.4 JPTM.1
JPTM.2 JPTM.3 JPTM.4 JPTM.5 JPTM.6 EP.1 EP.2 EP.3 EP.4 WP.1 WP.2 WP.3 WP.4 WP.5 PYFAG.1
PYFAG.2 PYFAG.3 PYFMI.1 PYFMI.2 PYFMI.3 PYFGS.1 PYFGS.2 PYFGS.3 PYFCS.1 PYFCS.1 PYFCS.2
PYFCS.3 PYFCS.4 PYFTD.1 PYFTD.2 PYFTD.3 PYFTD.4 PYFTC.1 PYFTC.2 PYFTC.3 PYFTC.4
PYFMA.1 PYFMA.2 PYFMA.3 PYFMA.4 PYFMA.5 PYFCN.1 PYFCN.2 PYFCN.3 PYFCN.4 PYFCN.5
TAG.0 TMI.0 TMA.0 TCN.0 TTD.0 TTC.0 TCS.0 TGS.0 TBC.0 TEW.0 TFI.0 TOG.0 TPR.0 TPS.0 TRE.0
A.AG.CG A.AG.CPCLO A.AG.CPENT A.AG.CPFOO A.AG.CPFUR A.AG.CPMED A.AG.CPOTH
A.AG.CPREN A.AG.CPABR A.AG.CPTRA A.AG.DS A.AG.JGB A.AG.JGTM A.AG.JOB A.AG.JOTM
A.AG.JPH A.AG.JPB A.AG.JPTM A.AG.XOG A.AG.XPR A.AG.XPS A.AG.XX A.BC.CG A.BC.CPCLO
A.BC.CPENT A.BC.CPFOO A.BC.CPFUR A.BC.CPMED A.BC.CPOTH A.BC.CPREN A.BC.CPABR
A.BC.CPTRA A.BC.DS A.BC.JGB A.BC.JGTM A.BC.JOB A.BC.JOTM A.BC.JPH A.BC.JPB A.BC.JPTM
A.BC.XOG A.BC.XPR A.BC.XPS A.BC.XX A.CN.CG A.CN.CPCLO A.CN.CPENT A.CN.CPFOO
A.CN.CPFUR A.CN.CPMED A.CN.CPOTH A.CN.CPREN A.CN.CPABR A.CN.CPTRA A.CN.DS A.CN.JGB
A.CN.JGTM A.CN.JOB A.CN.JOTM A.CN.JPH A.CN.JPB A.CN.JPTM A.CN.XOG A.CN.XPR A.CN.XPS
A.CN.XX A.CS.CG A.CS.CPCLO A.CS.CPENT A.CS.CPFOO A.CS.CPFUR A.CS.CPMED A.CS.CPOTH
A.CS.CPREN A.CS.CPABR A.CS.CPTRA A.CS.DS A.CS.JGB A.CS.JGTM A.CS.JOB A.CS.JOTM A.CS.JPH
A.CS.JPB A.CS.JPTM A.CS.XOG A.CS.XPR A.CS.XPS A.CS.XX A.EW.CG A.EW.CPCLO
A.EW.CPENT A.EW.CPFOO A.EW.CPFUR A.EW.CPMED A.EW.CPOTH A.EW.CPREN
A.EW.CPABR A.EW.CPTRA A.EW.DS A.EW.JGB A.EW.JGTM A.EW.JOB A.EW.JOTM A.EW.JPH
A.EW.JPB A.EW.JPTM A.EW.XOG A.EW.XPR A.EW.XPS A.EW.XX A.FI.CG A.FI.CPCLO A.FI.CPENT
```

A.FI.CPFOO A.FI.CPFUR A.FI.CPMED A.FI.CPOTH A.FI.CPREN A.FI.CPABR A.FI.CPTRA A.FI.DS
A.FI.JGB A.FI.JGTM A.FI.JOB A.FI.JOTM A.FI.JPH A.FI.JPB A.FI.JPTM A.FI.XOG A.FI.XPR A.FI.XPS
A.FI.XX A.GS.CG A.GS.CPCLO A.GS.CPENT A.GS.CPFOO A.GS.CPFUR A.GS.CPMED A.GS.CPOTH
A.GS.CPREN A.GS.CPABR A.GS.CPTRA A.GS.DS A.GS.JGB A.GS.JGTM A.GS.JOB A.GS.JOTM
A.GS.JPH A.GS.JPB A.GS.JPTM A.GS.XOG A.GS.XPR A.GS.XPS A.GS.XX A.ID.CG A.ID.CPCLO
A.ID.CPENT A.ID.CPFOO A.ID.CPFUR A.ID.CPMED A.ID.CPOTH A.ID.CPREN A.ID.CPABR
A.ID.CPTRA A.ID.DS A.ID.JGB A.ID.JGTM A.ID.JOB A.ID.JOTM A.ID.JPH A.ID.JPB A.ID.JPTM
A.ID.XOG A.ID.XPR A.ID.XPS A.ID.XX A.M.CG A.M.CPCLO A.M.CPENT A.M.CPFOO A.M.CPFUR
A.M.CPMED A.M.CPOTH A.M.CPREN A.M.CPABR A.M.CPTRA A.M.DS A.M.JGB A.M.JGTM A.M.JOB
A.M.JOTM A.M.JPH A.M.JPB A.M.JPTM A.M.XOG A.M.XPR A.M.XPS A.M.XX A.MA.CG A.MA.CPCLO
A.MA.CPENT A.MA.CPFOO A.MA.CPFUR A.MA.CPMED A.MA.CPOTH A.MA.CPREN A.MA.CPABR
A.MA.CPTRA A.MA.DS A.MA.JGB A.MA.JGTM A.MA.JOB A.MA.JOTM A.MA.JPH A.MA.JPB
A.MA.JPTM A.MA.XOG A.MA.XPR A.MA.XPS A.MA.XX A.MI.CG A.MI.CPCLO A.MI.CPENT
A.MI.CPFOO A.MI.CPFUR A.MI.CPMED A.MI.CPOTH A.MI.CPREN A.MI.CPABR A.MI.CPTRA A.MI.DS
A.MI.JGB A.MI.JGTM A.MI.JOB A.MI.JOTM A.MI.JPH A.MI.JPB A.MI.JPTM A.MI.XOG A.MI.XPR
A.MI.XPS A.MI.XX A.OG.CG A.OG.CPCLO A.OG.CPENT A.OG.CPFOO A.OG.CPFUR A.OG.CPMED
A.OG.CPOTH A.OG.CPREN A.OG.CPABR A.OG.CPTRA A.OG.DS A.OG.JGB A.OG.JGTM A.OG.JOB
A.OG.JOTM A.OG.JPH A.OG.JPB A.OG.JPTM A.OG.XOG A.OG.XPR A.OG.XPS A.OG.XX A.PR.CG
A.PR.CPCLO A.PR.CPENT A.PR.CPFOO A.PR.CPFUR A.PR.CPMED A.PR.CPOTH A.PR.CPREN
A.PR.CPABR A.PR.CPTRA A.PR.DS A.PR.JGB A.PR.JGTM A.PR.JOB A.PR.JOTM A.PR.JPH A.PR.JPB
A.PR.JPTM A.PR.XOG A.PR.XPR A.PR.XPS A.PR.XX A.PS.CG A.PS.CPCLO A.PS.CPENT A.PS.CPFOO
A.PS.CPFUR A.PS.CPMED A.PS.CPOTH A.PS.CPREN A.PS.CPABR A.PS.CPTRA A.PS.DS A.PS.JGB
A.PS.JGTM A.PS.JOB A.PS.JOTM A.PS.JPH A.PS.JPB A.PS.JPTM A.PS.XOG A.PS.XPR A.PS.XPS
A.PS.XX A.RE.CG A.RE.CPCLO A.RE.CPENT A.RE.CPFOO A.RE.CPFUR A.RE.CPMED A.RE.CPOTH
A.RE.CPREN A.RE.CPABR A.RE.CPTRA A.RE.DS A.RE.JGB A.RE.JGTM A.RE.JOB A.RE.JOTM
A.RE.JPH A.RE.JPB A.RE.JPTM A.RE.XOG A.RE.XPR A.RE.XPS A.RE.XX A.TC.CG A.TC.CPCLO
A.TC.CPENT A.TC.CPFOO A.TC.CPFUR A.TC.CPMED A.TC.CPOTH A.TC.CPREN A.TC.CPABR
A.TC.CPTRA A.TC.DS A.TC.JGB A.TC.JGTM A.TC.JOB A.TC.JOTM A.TC.JPH A.TC.JPB A.TC.JPTM
A.TC.XOG A.TC.XPR A.TC.XPS A.TC.XX A.TD.CG A.TD.CPCLO A.TD.CPENT A.TD.CPFOO
A.TD.CPFUR A.TD.CPMED A.TD.CPOTH A.TD.CPREN A.TD.CPABR A.TD.CPTRA A.TD.DS A.TD.JGB
A.TD.JGTM A.TD.JOB A.TD.JOTM A.TD.JPH A.TD.JPB A.TD.JPTM A.TD.XOG A.TD.XPR A.TD.XPS
A.TD.XX;

Filemod;

5.1.2. Multimod.inp

```
option screen off;

/* Input file MULTIMOD.INP.

/* This input file in used to generate the sub-model MULTI into TROLL format. The model itself concist of
/* the 21 price equations, and is used in calculation of the multiplicative residuals.

/* The residuals are simulated in the file RESMULTI.INP.

/* In some cases it will be preferable to run only this file. Therefore it must have it's own access and search
/* commands. It also must have a delaccess and a delsearch command to delete eventually accesses and searches
/* given earlier.

delaccess all;
delsearch all;

input accessim;
input srchtime;

usemod multi;
modedit;
addeq top,
```

```
PCPFOO=
(MS*A.M.CPFOO*PM+
A.AG.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYAG+
A.MI.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYMI+
A.PS.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYPS+
A.MA.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYMA+
A.EW.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYEW+
A.CN.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYCN+
A.TD.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYTD+
A.TC.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYTC+
A.RE.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYRE+
A.FI.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYFI+
A.CS.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYCS+
A.GS.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYGS+
A.BC.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYBC+
A.OG.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYOG+
A.PR.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYPR+
A.ID.CPFOO*(1-MS*A.M.CPFOO)/(1-A.M.CPFOO)*PYID)*RPCPFOO ,

PCPCLO=
(MS*A.M.CPCLO*PM+
A.AG.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYAG+
A.MI.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYMI+
A.PS.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYPS+
A.MA.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYMA+
A.EW.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYEW+
A.CN.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYCN+
A.TD.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYTD+
A.TC.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYTC+
A.RE.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYRE+
A.FI.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYFI+
A.CS.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYCS+
A.GS.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYGS+
A.BC.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYBC+
A.OG.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYOG+
A.PR.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYPR+
A.ID.CPCLO*(1-MS*A.M.CPCLO)/(1-A.M.CPCLO)*PYID)*RPCPCLO ,

PCPREN=
(MS*A.M.CPREN*PM+
A.AG.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYAG+
A.MI.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYMI+
A.PS.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYPS+
A.MA.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYMA+
A.EW.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYEW+
A.CN.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYCN+
A.TD.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYTD+
A.TC.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYTC+
A.RE.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYRE+
A.FI.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYFI+
A.CS.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYCS+
A.GS.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYGS+
A.BC.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYBC+
A.OG.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYOG+
A.PR.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYPR+
A.ID.CPREN*(1-MS*A.M.CPREN)/(1-A.M.CPREN)*PYID)*RPCPREN ,
```

```
PCPFUR=
(MS*A.M.CPFUR*PM+
A.AG.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYAG+
A.MI.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYMI+
A.PS.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYPS+
A.MA.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYMA+
A.EW.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYEW+
A.CN.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYCN+
A.TD.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYTD+
A.TC.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYTC+
A.RE.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYRE+
A.FI.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYFI+
A.CS.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYCS+
A.GS.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYGS+
A.BC.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYBC+
A.OG.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYOG+
A.PR.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYPR+
A.ID.CPFUR*(1-MS*A.M.CPFUR)/(1-A.M.CPFUR)*PYID)*RPCPFUR ,

PCPMED=
(MS*A.M.CPMED*PM+
A.AG.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYAG+
A.MI.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYMI+
A.PS.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYPS+
A.MA.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYMA+
A.EW.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYEW+
A.CN.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYCN+
A.TD.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYTD+
A.TC.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYTC+
A.RE.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYRE+
A.FI.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYFI+
A.CS.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYCS+
A.GS.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYGS+
A.BC.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYBC+
A.OG.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYOG+
A.PR.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYPR+
A.ID.CPMED*(1-MS*A.M.CPMED)/(1-A.M.CPMED)*PYID)*RPCPMED ,

PCPTRA=
(MS*A.M.CPTRA*PM+
A.AG.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYAG+
A.MI.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYMI+
A.PS.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYPS+
A.MA.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYMA+
A.EW.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYEW+
A.CN.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYCN+
A.TD.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYTD+
A.TC.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYTC+
A.RE.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYRE+
A.FI.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYFI+
A.CS.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYCS+
A.GS.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYGS+
A.BC.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYBC+
A.OG.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYOG+
A.PR.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYPR+
A.ID.CPTRA*(1-MS*A.M.CPTRA)/(1-A.M.CPTRA)*PYID)*RPCPTRA ,

PCPENT=
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(MS*A.M.CPENT*PM+
A.AG.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYAG+
A.MI.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYMI+
A.PS.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYPS+
A.MA.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYMA+
A.EW.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYEW+
A.CN.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYCN+
A.TD.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYTD+
A.TC.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYTC+
A.RE.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYRE+
A.FI.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYFI+
A.CS.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYCS+
A.GS.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYGS+
A.BC.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYBC+
A.OG.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYOG+
A.PR.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYPR+
A.ID.CPENT*(1-MS*A.M.CPENT)/(1-A.M.CPENT)*PYID)*RPCPENT ,

PCPOTH=
(MS*A.M.CPOTH*PM+
A.AG.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYAG+
A.MI.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYMI+
A.PS.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYPS+
A.MA.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYMA+
A.EW.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYEW+
A.CN.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYCN+
A.TD.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYTD+
A.TC.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYTC+
A.RE.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYRE+
A.FI.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYFI+
A.CS.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYCS+
A.GS.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYGS+
A.BC.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYBC+
A.OG.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYOG+
A.PR.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYPR+
A.ID.CPOTH*(1-MS*A.M.CPOTH)/(1-A.M.CPOTH)*PYID)*RPCPOTH ,

PCPABR=
(MS*A.M.CPABR*PM+
A.AG.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYAG+
A.MI.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYMI+
A.PS.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYPS+
A.MA.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYMA+
A.EW.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYEW+
A.CN.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYCN+
A.TD.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYTD+
A.TC.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYTC+
A.RE.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYRE+
A.FI.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYFI+
A.CS.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYCS+
A.GS.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYGS+
A.BC.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYBC+
A.OG.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYOG+
A.PR.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYPR+
A.ID.CPABR*(1-MS*A.M.CPABR)/(1-A.M.CPABR)*PYID )*RPCPABR,

PJPH=
(MS*A.M.JPH*PM+
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A.AG.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYAG+
A.MI.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYMI+
A.PS.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYPS+
A.MA.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYMA+
A.EW.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYEW+
A.CN.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYCN+
A.TD.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYTD+
A.TC.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYTC+
A.RE.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYRE+
A.FI.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYFI+
A.CS.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYCS+
A.GS.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYGS+
A.BC.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYBC+
A.OG.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYOG+
A.PR.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYPR+
A.ID.JPH*(1-MS*A.M.JPH)/(1-A.M.JPH)*PYID)*RPJPH ,

PJPB=
(MS*A.M.JPB*PM+
A.AG.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYAG+
A.MI.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYMI+
A.PS.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYPS+
A.MA.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYMA+
A.EW.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYEW+
A.CN.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYCN+
A.TD.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYTD+
A.TC.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYTC+
A.RE.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYRE+
A.FI.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYFI+
A.CS.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYCS+
A.GS.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYGS+
A.BC.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYBC+
A.OG.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYOG+
A.PR.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYPR+
A.ID.JPB*(1-MS*A.M.JPB)/(1-A.M.JPB)*PYID)*RPJPB ,

PJPTM=
(MS*A.M.JPTM*PM+
A.AG.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYAG+
A.MI.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYMI+
A.PS.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYPS+
A.MA.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYMA+
A.EW.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYEW+
A.CN.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYCN+
A.TD.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYTD+
A.TC.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYTC+
A.RE.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYRE+
A.FI.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYFI+
A.CS.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYCS+
A.GS.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYGS+
A.BC.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYBC+
A.OG.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYOG+
A.PR.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYPR+
A.ID.JPTM*(1-MS*A.M.JPTM)/(1-A.M.JPTM)*PYID)*RPJPTM ,

PJGB=
(MS*A.M.JGB*PM+
A.AG.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYAG+
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A.MI.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYMI+
A.PS.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYPS+
A.MA.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYMA+
A.EW.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYEW+
A.CN.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYCN+
A.TD.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYTD+
A.TC.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYTC+
A.RE.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYRE+
A.FI.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYFI+
A.CS.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYCS+
A.GS.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYGS+
A.BC.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYBC+
A.OG.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYOG+
A.PR.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYPR+
A.ID.JGB*(1-MS*A.M.JGB)/(1-A.M.JGB)*PYID)*RPJGB ,

PJGTM=
(MS*A.M.JGTM*PM+
A.AG.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYAG+
A.MI.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYMI+
A.PS.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYPS+
A.MA.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYMA+
A.EW.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYEW+
A.CN.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYCN+
A.TD.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYTD+
A.TC.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYTC+
A.RE.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYRE+
A.FI.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYFI+
A.CS.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYCS+
A.GS.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYGS+
A.BC.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYBC+
A.OG.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYOG+
A.PR.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYPR+
A.ID.JGTM*(1-MS*A.M.JGTM)/(1-A.M.JGTM)*PYID)*RPJGTM ,

PJOB=
(MS*A.M.JOB*PM+
A.AG.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYAG+
A.MI.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYMI+
A.PS.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYPS+
A.MA.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYMA+
A.EW.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYEW+
A.CN.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYCN+
A.TD.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYTD+
A.TC.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYTC+
A.RE.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYRE+
A.FI.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYFI+
A.CS.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYCS+
A.GS.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYGS+
A.BC.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYBC+
A.OG.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYOG+
A.PR.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYPR+
A.ID.JOB*(1-MS*A.M.JOB)/(1-A.M.JOB)*PYID)*RPJOB ,
PJOTM=
(MS*A.M.JOTM*PM+
A.AG.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYAG+
A.MI.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYMI+
A.PS.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYPS+
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A.MA.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYMA+
A.EW.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYEW+
A.CN.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYCN+
A.TD.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYTD+
A.TC.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYTC+
A.RE.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYRE+
A.FI.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYFI+
A.CS.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYCS+
A.GS.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYGS+
A.BC.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYBC+
A.OG.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYOG+
A.PR.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYPR+
A.ID.JOTM*(1-MS*A.M.JOTM)/(1-A.M.JOTM)*PYID)*RPJOTM ,

PCG=
(MS*A.M.CG*PM+
A.AG.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYAG+
A.MI.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYMI+
A.PS.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYPS+
A.MA.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYMA+
A.EW.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYEW+
A.CN.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYCN+
A.TD.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYTD+
A.TC.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYTC+
A.RE.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYRE+
A.FI.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYFI+
A.CS.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYCS+
A.GS.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYGS+
A.BC.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYBC+
A.OG.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYOG+
A.PR.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYPR+
A.ID.CG*(1-MS*A.M.CG)/(1-A.M.CG)*PYID )*RPCG,

PXOG=
(MS*A.M.XOG*PM+
A.AG.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYAG+
A.MI.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYMI+
A.PS.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYPS+
A.MA.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYMA+
A.EW.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYEW+
A.CN.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYCN+
A.TD.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYTD+
A.TC.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYTC+
A.RE.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYRE+
A.FI.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYFI+
A.CS.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYCS+
A.GS.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYGS+
A.BC.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYBC+
A.OG.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYOG+
A.PR.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYPR+
A.ID.XOG*(1-MS*A.M.XOG)/(1-A.M.XOG)*PYID)*RPXOG ,

PXPR=
(MS*A.M.XPR*PM+
A.AG.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYAG+
A.MI.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYMI+
A.PS.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYPS+
A.MA.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYMA+
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A.EW.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYEW+
A.CN.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYCN+
A.TD.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYTD+
A.TC.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYTC+
A.RE.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYRE+
A.FI.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYFI+
A.CS.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYCS+
A.GS.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYGS+
A.BC.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYBC+
A.OG.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYOG+
A.PR.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYPR+
A.ID.XPR*(1-MS*A.M.XPR)/(1-A.M.XPR)*PYID)*RPXPR ,

PXPS=
(MS*A.M.XPS*PM+
A.AG.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYAG+
A.MI.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYMI+
A.PS.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYPS+
A.MA.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYMA+
A.EW.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYEW+
A.CN.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYCN+
A.TD.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYTD+
A.TC.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYTC+
A.RE.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYRE+
A.FI.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYFI+
A.CS.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYCS+
A.GS.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYGS+
A.BC.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYBC+
A.OG.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYOG+
A.PR.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYPR+
A.ID.XPS*(1-MS*A.M.XPS)/(1-A.M.XPS)*PYID)*RPXPS ,

PXX=
(MS*A.M.XX*PM+
A.AG.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYAG+
A.MI.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYMI+
A.PS.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYPS+
A.MA.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYMA+
A.EW.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYEW+
A.CN.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYCN+
A.TD.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYTD+
A.TC.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYTC+
A.RE.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYRE+
A.FI.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYFI+
A.CS.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYCS+
A.GS.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYGS+
A.BC.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYBC+
A.OG.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYOG+
A.PR.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYPR+
A.ID.XX*(1-MS*A.M.XX)/(1-A.M.XX)*PYID)*RPXX ;

CHANGESYM ENDOGENOUS
RPCPFOO RPCPCLO RPCPREN RPCPFUR RPCPMED RPCPTRA RPCPENT RPCPOTH RPCPABR
RPJPH RPJPB RPJPTM RPJGB RPJGTM RPJOB RPJOTM RPCG RPXOG RPXPR RPXPS RPXX ;

CHANGESYM COEFFICIENT
A.AG.CG A.AG.CPCLO A.AG.CPENT A.AG.CPFOO A.AG.CPFUR A.AG.CPMED A.AG.CPOTH
A.AG.CPREN A.AG.CPABR A.AG.CPTRA A.AG.JGB A.AG.JGTM A.AG.JOB A.AG.JOTM A.AG.JPH
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A.AG.JPB A.AG.JPTM A.AG.XOG A.AG.XPR A.AG.XPS A.AG.XX A.BC.CG A.BC.CPCLO A.BC.CPENT A.BC.CPFOO A.BC.CPFUR A.BC.CPMED A.BC.CPOTH A.BC.CPREN A.BC.CPABR A.BC.CPTRA A.BC.JGB A.BC.JGTM A.BC.JOB A.BC.JOTM A.BC.JPH A.BC.JPB A.BC.JPTM A.BC.XOG A.BC.XPR A.BC.XPS A.BC.XX A.CN.CG A.CN.CPCLO A.CN.CPENT A.CN.CPFOO A.CN.CPFUR A.CN.CPMED A.CN.CPOTH A.CN.CPREN A.CN.CPABR A.CN.CPTRA A.CN.JGB A.CN.JGTM A.CN.JOB A.CN.JOTM A.CN.JPH A.CN.JPB A.CN.JPTM A.CN.XOG A.CN.XPR A.CN.XPS A.CN.XX A.CS.CG A.CS.CPCLO A.CS.CPENT A.CS.CPFOO A.CS.CPFUR A.CS.CPMED A.CS.CPOTH A.CS.CPREN A.CS.CPABR A.CS.CPTRA A.CS.JGB A.CS.JGTM A.CS.JOB A.CS.JOTM A.CS.JPH A.CS.JPB A.CS.JPTM A.CS.XOG A.CS.XPR A.CS.XPS A.CS.XX A.EW.CG A.EW.CPCLO A.EW.CPENT A.EW.CPFOO A.EW.CPFUR A.EW.CPMED A.EW.CPOTH A.EW.CPREN A.EW.CPABR A.EW.CPTRA A.EW.JGB A.EW.JGTM A.EW.JOB A.EW.JOTM A.EW.JPH A.EW.JPB A.EW.JPTM A.EW.XOG A.EW.XPR A.EW.XPS A.EW.XX A.FI.CG A.FI.CPCLO A.FI.CPENT A.FI.CPFOO A.FI.CPFUR A.FI.CPMED A.FI.CPOTH A.FI.CPREN A.FI.CPABR A.FI.CPTRA A.FI.JGB A.FI.JGTM A.FI.JOB A.FI.JOTM A.FI.JPH A.FI.JPB A.FI.JPTM A.FI.XOG A.FI.XPR A.FI.XPS A.FI.XX A.GS.CG A.GS.CPCLO A.GS.CPENT A.GS.CPFOO A.GS.CPFUR A.GS.CPMED A.GS.CPOTH A.GS.CPREN A.GS.CPABR A.GS.CPTRA A.GS.JGB A.GS.JGTM A.GS.JOB A.GS.JOTM A.GS.JPH A.GS.JPB A.GS.JPTM A.GS.XOG A.GS.XPR A.GS.XPS A.GS.XX A.ID.CG A.ID.CPCLO A.ID.CPENT A.ID.CPFOO A.ID.CPFUR A.ID.CPMED A.ID.CPOTH A.ID.CPREN A.ID.CPABR A.ID.CPTRA A.ID.JGB A.ID.JGTM A.ID.JOB A.ID.JOTM A.ID.JPH A.ID.JPB A.ID.JPTM A.ID.XOG A.ID.XPR A.ID.XPS A.ID.XX A.M.CG A.M.CPCLO A.M.CPENT A.M.CPFOO A.M.CPFUR A.M.CPMED A.M.CPOTH A.M.CPREN A.M.CPABR A.M.CPTRA A.M.JGB A.M.JGTM A.M.JOB A.M.JOTM A.M.JPH A.M.JPB A.M.JPTM A.M.XOG A.M.XPR A.M.XPS A.M.XX A.MA.CG A.MA.CPCLO A.MA.CPENT A.MA.CPFOO A.MA.CPFUR A.MA.CPMED A.MA.CPOTH A.MA.CPREN A.MA.CPABR A.MA.CPTRA A.MA.JGB A.MA.JGTM A.MA.JOB A.MA.JOTM A.MA.JPH A.MA.JPB A.MA.JPTM A.MA.XOG A.MA.XPR A.MA.XPS A.MA.XX A.MI.CG A.MI.CPCLO A.MI.CPENT A.MI.CPFOO A.MI.CPFUR A.MI.CPMED A.MI.CPOTH A.MI.CPREN A.MI.CPABR A.MI.CPTRA A.MI.JGB A.MI.JGTM A.MI.JOB A.MI.JOTM A.MI.JPH A.MI.JPB A.MI.JPTM A.MI.XOG A.MI.XPR A.MI.XPS A.MI.XX A.OG.CG A.OG.CPCLO A.OG.CPENT A.OG.CPFOO A.OG.CPFUR A.OG.CPMED A.OG.CPOTH A.OG.CPREN A.OG.CPABR A.OG.CPTRA A.OG.JGB A.OG.JGTM A.OG.JOB A.OG.JOTM A.OG.JPH A.OG.JPB A.OG.JPTM A.OG.XOG A.OG.XPR A.OG.XPS A.OG.XX A.PR.CG A.PR.CPCLO A.PR.CPENT A.PR.CPFOO A.PR.CPFUR A.PR.CPMED A.PR.CPOTH A.PR.CPREN A.PR.CPABR A.PR.CPTRA A.PR.JGB A.PR.JGTM A.PR.JOB A.PR.JOTM A.PR.JPH A.PR.JPB A.PR.JPTM A.PR.XOG A.PR.XPR A.PR.XPS A.PR.XX A.PS.CG A.PS.CPCLO A.PS.CPENT A.PS.CPFOO A.PS.CPFUR A.PS.CPMED A.PS.CPOTH A.PS.CPREN A.PS.CPABR A.PS.CPTRA A.PS.JGB A.PS.JGTM A.PS.JOB A.PS.JOTM A.PS.JPH A.PS.JPB A.PS.JPTM A.PS.XOG A.PS.XPR A.PS.XPS A.PS.XX A.RE.CG A.RE.CPCLO A.RE.CPENT A.RE.CPFOO A.RE.CPFUR A.RE.CPMED A.RE.CPOTH A.RE.CPREN A.RE.CPABR A.RE.CPTRA A.RE.JGB A.RE.JGTM A.RE.JOB A.RE.JOTM A.RE.JPH A.RE.JPB A.RE.JPTM A.RE.XOG A.RE.XPR A.RE.XPS A.RE.XX A.TC.CG A.TC.CPCLO A.TC.CPENT A.TC.CPFOO A.TC.CPFUR A.TC.CPMED A.TC.CPOTH A.TC.CPREN A.TC.CPABR A.TC.CPTRA A.TC.JGB A.TC.JGTM A.TC.JOB A.TC.JOTM A.TC.JPH A.TC.JPB A.TC.JPTM A.TC.XOG A.TC.XPR A.TC.XPS A.TC.XX A.TD.CG A.TD.CPCLO A.TD.CPENT A.TD.CPFOO A.TD.CPFUR A.TD.CPMED A.TD.CPOTH A.TD.CPREN A.TD.CPABR A.TD.CPTRA A.TD.JGB A.TD.JGTM A.TD.JOB A.TD.JOTM A.TD.JPH A.TD.JPB A.TD.JPTM A.TD.XOG A.TD.XPR A.TD.XPS A.TD.XX;

Filemod ;

5.1.3. Additmod.inp

```
option screen off;

/* Input file ADDITMOD.INP.

/* When the time series data base is updated or corrected it must be generated into TROLL format. This is
/* done with the input file DATABANK.INP, which in turn executes four other input files. The first two
/* of them is; 1) the input file for generation of the time series data base (MAINDAT.INP), 2) the input file that
/* defines some new variables and that calculates the tax variables (TRANSDAT.INP).

/* Since the residuals can be interpreted as "ordinary" variables in the main model, they need to have historical
/* values in the data base before the model can be simulated. Otherwise they has to be declared as endogenous
/* variables and calculated inside the main model. This would have required many additional equations just to
```

```
/* calculate the residuals.

/* Instead we calculate the residuals outside the main model, in a sub-model. The sub-model itself has no
/* residuals occuring in the equations. It consist of 44 equations, 16 of them to calculate the residuals from
/* "Production by sector", or "GDP by economic activity". The rest of the equations are used to calculate
/* the residuals in other equations, amongst them "Residential consumption by consumer groups",
/* prices, employment and investment.

/* The model is saved to the disk directory for models.

/* From this point on the file only plays a "passive" role in the generation of the time series data base, in the
/* sense that it is "called upon" by another input file. The file RESADDIT.INP uses the model (generated by
/* ADDITMOD.INP) to take the difference between the historical data for "Production by sector" on the left
/* hand side of the equations, and the combination of the final deman components on the right hand side of the
/* equations (calculated with the estimated I/O-coefficients). In a way we "restrict" the left and right hand side
/* to be equal even if we know that this is not in general true, and then takes the difference.

/* This is done with the EQEVAL command. The residuals are saved together with the historical time series.

/* An important point to remember is that the endogenous values (the left hand side) of the equations are not
/* simulated and saved. Instead the RESADDIT.INP command call this model and calculates the difference
/* between the historical value and the expression on the right hand side. This difference is important, because
/* it implies that the residuals are calculated in a "static" way, by taking the difference between the left and
/* the right hand side of each equation for each time period. Further, this implies that the residuals consist of
/* errors due to the updating of the i/o-coefficients.

/* The notation is as follows: A.AG.CPFOO is the I/O-coefficient between "Agriculture, forestry and fishing"
/* sector (AG) and private consumption of food and beverages (CPFOO). The "A" in the beginning simply
/* means that this is an I/O-coefficient.

usemod addit;
modedit;
addeq top,

/* The left hand side are "Production by sector", or "GDP by economic activity".
/* All time series are measured in constant 1989 prices (million riyals).

/* Production in "Agriculture, forestry and fishing".

YAG =
A.AG.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.AG.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.AG.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.AG.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.AG.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.AG.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.AG.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.AG.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.AG.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.AG.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.AG.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.AG.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.AG.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.AG.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.AG.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.AG.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.AG.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.AG.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
```

```
A.AG.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.AG.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.AG.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.AG.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Other mining, quarrying.

YMI =
A.MI.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.MI.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.MI.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.MI.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.MI.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.MI.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.MI.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.MI.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.MI.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.MI.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.MI.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.MI.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.MI.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.MI.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.MI.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.MI.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.MI.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.MI.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.MI.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.MI.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.MI.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.MI.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Petrochemicals".

YPS =
A.PS.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.PS.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.PS.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.PS.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.PS.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.PS.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.PS.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.PS.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.PS.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.PS.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.PS.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.PS.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.PS.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.PS.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.PS.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.PS.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.PS.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.PS.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.PS.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.PS.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.PS.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.PS.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Other manufactering".
```

```
YMA =
A.MA.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.MA.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.MA.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.MA.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.MA.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.MA.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.MA.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.MA.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.MA.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.MA.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.MA.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.MA.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.MA.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.MA.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.MA.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.MA.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.MA.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.MA.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.MA.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.MA.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.MA.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.MA.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Electricity, gas and water".

YEW =
A.EW.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.EW.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.EW.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.EW.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.EW.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.EW.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.EW.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.EW.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.EW.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.EW.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.EW.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.EW.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.EW.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.EW.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.EW.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.EW.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.EW.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.EW.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.EW.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.EW.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.EW.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.EW.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Construction".
YCN =
A.CN.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.CN.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.CN.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.CN.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.CN.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
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A.CN.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.CN.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.CN.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.CN.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.CN.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.CN.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.CN.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.CN.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.CN.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.CN.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.CN.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.CN.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.CN.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.CN.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.CN.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.CN.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.CN.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Wholesale and retail trade".

YTD =
A.TD.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.TD.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.TD.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.TD.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.TD.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.TD.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.TD.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.TD.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.TD.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.TD.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.TD.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.TD.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.TD.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.TD.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.TD.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.TD.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.TD.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.TD.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.TD.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.TD.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.TD.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.TD.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Transport and communication".

YTC =
A.TC.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.TC.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.TC.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.TC.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.TC.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.TC.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.TC.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.TC.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.TC.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.TC.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.TC.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
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A.TC.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.TC.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.TC.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.TC.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.TC.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.TC.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.TC.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.TC.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.TC.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.TC.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.TC.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Real estate".

YRE =
A.RE.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.RE.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.RE.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.RE.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.RE.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.RE.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.RE.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.RE.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.RE.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.RE.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.RE.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.RE.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.RE.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.RE.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.RE.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.RE.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.RE.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.RE.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.RE.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.RE.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.RE.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.RE.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Finance, insurance".

YFI =
A.FI.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.FI.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.FI.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.FI.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.FI.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.FI.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.FI.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.FI.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.FI.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.FI.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.FI.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.FI.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.FI.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.FI.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.FI.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.FI.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.FI.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
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A.FI.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.FI.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.FI.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.FI.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.FI.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Community services".

YCS =
A.CS.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.CS.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.CS.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.CS.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.CS.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.CS.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.CS.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.CS.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.CS.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.CS.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.CS.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.CS.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.CS.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.CS.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.CS.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.CS.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.CS.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.CS.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.CS.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.CS.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.CS.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.CS.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Government services".

YGS =
A.GS.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.GS.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.GS.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.GS.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.GS.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.GS.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.GS.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.GS.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.GS.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.GS.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.GS.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.GS.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.GS.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.GS.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.GS.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.GS.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.GS.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.GS.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.GS.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.GS.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.GS.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.GS.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,
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/* Production in "Imputed bank charges".

YBC =
A.BC.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.BC.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.BC.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.BC.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.BC.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.BC.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.BC.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.BC.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.BC.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.BC.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.BC.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.BC.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.BC.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.BC.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.BC.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.BC.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.BC.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.BC.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.BC.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.BC.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.BC.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.BC.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Crude oil and natural gas".

YOG =
A.OG.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.OG.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.OG.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.OG.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.OG.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.OG.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.OG.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.OG.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.OG.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.OG.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.OG.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.OG.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.OG.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.OG.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.OG.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.OG.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.OG.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.OG.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.OG.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.OG.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.OG.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.OG.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Petroleum refining".

YPR =
A.PR.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.PR.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.PR.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
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A.PR.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.PR.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.PR.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.PR.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.PR.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.PR.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.PR.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.PR.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.PR.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.PR.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.PR.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.PR.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.PR.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.PR.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.PR.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.PR.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.PR.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.PR.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.PR.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

/* Production in "Import duties".

YID =
A.ID.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
A.ID.CPCLO * (1 - MS * A.M.CPCLO)/(1 - A.M.CPCLO) * CPCLO +
A.ID.CPREN * (1 - MS * A.M.CPREN)/(1 - A.M.CPREN) * CPREN +
A.ID.CPFUR * (1 - MS * A.M.CPFUR)/(1 - A.M.CPFUR) * CPFUR +
A.ID.CPMED * (1 - MS * A.M.CPMED)/(1 - A.M.CPMED) * CPMED +
A.ID.CPTRA * (1 - MS * A.M.CPTRA)/(1 - A.M.CPTRA) * CPTRA +
A.ID.CPENT * (1 - MS * A.M.CPENT)/(1 - A.M.CPENT) * CPENT +
A.ID.CPOTH * (1 - MS * A.M.CPOTH)/(1 - A.M.CPOTH) * CPOTH +
A.ID.CPABR * (1 - MS * A.M.CPABR)/(1 - A.M.CPABR) * CPABR +
A.ID.JPH * (1 - MS * A.M.JPH)/(1 - A.M.JPH) * JPH +
A.ID.JPB * (1 - MS * A.M.JPB)/(1 - A.M.JPB) * JPB +
A.ID.JPTM * (1 - MS * A.M.JPTM)/(1 - A.M.JPTM) * JPTM +
A.ID.JGB * (1 - MS * A.M.JGB)/(1 - A.M.JGB) * JGB +
A.ID.JGTM * (1 - MS * A.M.JGTM)/(1 - A.M.JGTM) * JGTM +
A.ID.JOB * (1 - MS * A.M.JOB)/(1 - A.M.JOB) * JOB +
A.ID.JOTM * (1 - MS * A.M.JOTM)/(1 - A.M.JOTM) * JOTM +
A.ID.CG * (1 - MS * A.M.CG)/(1 - A.M.CG) * CG +
A.ID.DS * (1 - MS * A.M.DS)/(1 - A.M.DS) * DS +
A.ID.XOG * (1 - MS * A.M.XOG)/(1 - A.M.XOG) * XOG +
A.ID.XPR * (1 - MS * A.M.XPR)/(1 - A.M.XPR) * XPR +
A.ID.XPS * (1 - MS * A.M.XPS)/(1 - A.M.XPS) * XPS +
A.ID.XX * (1 - MS * A.M.XX)/(1 - A.M.XX) * XX,

LOG(PYFAG) - LOG(PYFAG( - 1)) =
PYFAG.1 + PYFAG.2 * (LOG(WP) - LOG(WP( - 1))) + PYFAG.3 * ( LOG(PYFAG( - 1)) - LOG(WP( - 1))),

LOG(PYFMI) - LOG(PYFMI( - 1)) =
PYFMI.1 + PYFMI.2 * (LOG(WP) - LOG(WP( - 1))) + PYFMI.3 * ( LOG(PYFMI( - 1)) - LOG(WP( - 1))),

LOG(PYFMA) - LOG(PYFMA( - 1)) =
PYFMA.1 + PYFMA.2 * (LOG(WP) - LOG(WP( - 1))) + PYFMA.3 * (LOG(PM) - LOG(PM( - 1))) +
PYFMA.4 * (LOG(PYFMA( - 1)) - LOG(WP( - 1))) + PYFMA.5 * (LOG(PYFMA( - 1)) - LOG(PM( - 1))),

LOG(PYFCN) - LOG(PYFCN( - 1)) =
```

PYFCN.1 + PYFCN.2 * (LOG(WP) - LOG(WP(- 1))) + PYFCN.3 * (LOG(PM) - LOG(PM(- 1))) + PYFCN.4 * (LOG(PYFCN(- 1)) - LOG(WP(- 1))) + PYFCN.5 * (LOG(PYFCN(- 1)) - LOG(PM(- 1))),

LOG(PYFTD) - LOG(PYFTD(- 1)) =
PYFTD.1 + PYFTD.2 * (LOG(WP) - LOG(WP(- 1))) + PYFTD.3 * (LOG(PM) - LOG(PM(- 1))) + PYFTD.4 * (LOG(PYFTD(- 1)) - LOG(WP(- 1))) ,

LOG(PYFTC) - LOG(PYFTC(- 1)) =
PYFTC.1 + PYFTC.2 * (LOG(WP) - LOG(WP(- 1))) + PYFTC.3 * (LOG(PM) - LOG(PM(- 1))) + PYFTC.4 * (LOG(PYFTC(- 1)) - LOG(WP(- 1))) ,

LOG(PYFCS) - LOG(PYFCS(- 1)) =
PYFCS.1 + PYFCS.2 * (LOG(WP) - LOG(WP(- 1))) + PYFCS.3 * (LOG(PM) - LOG(PM(- 1))) + PYFCS.4 * (LOG(PYFCS(- 1)) - LOG(WP(- 1))) ,

LOG(PYFGS) - LOG(PYFGS(- 1)) =
PYFGS.1 + PYFGS.2 * (LOG(WG) - LOG(WG(- 1))) + PYFGS.3 * (LOG(PYFGS(- 1)) - LOG(WG(- 1))),

CPRFOO =
CPRFOO.1 + (CPRFOO.2/PCPFOO) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRCLO =
CPRCLO.1 + (CPRCLO.2/PCPCLO) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRREN =
CPRREN.1 + (CPRREN.2/PCPREN) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRFUR =
CPRFUR.1 + (CPRFUR.2/PCPFUR) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRMED =
CPRMED.1 + (CPRMED.2/PCPMED) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRTRA =
CPRTRA.1 + (CPRTRA.2/PCPTRA) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPRENT =
CPRENT.1 + (CPRENT.2/PCPENT) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

CPROTH =
CPROTH.1 + (CPROTH.2/PCPOTH) * (VCPR - (CPRFOO.1 * PCPFOO + CPRCLO.1 * PCPCLO + CPRREN.1 * PCPREN + CPRFUR.1 * PCPFUR + CPRMED.1 * PCPMED + CPRTRA.1 * PCPTRA + CPRENT.1 * PCPENT + CPROTH.1 * PCPOTH + CPRABR.1 * PCPABR)),

```
LOG(CPR) - LOG(CPR( - 1)) =
CPR.1 + CPR.2 * (LOG((HR * (1 - THR))/PCPR) - LOG((HR( - 1) * (1 - THR( - 1)))/PCPR( - 1))) + CPR.3 *
(LOG(CPR( - 1)) - LOG((HR( - 1) * (1 - THR( - 1))/PCPR( - 1)))) + CPR.4 * (LOG(CPR( - 1)) - LOG(HW( -
2)/PCPR( - 2))) + CPR.5 * (POIL/PCPR) + CPR.6 * D9091,

LOG(JPH) - LOG(JPH( - 1)) =
JPH.1 + JPH.2 * (LOG(ICH/PJPH) - LOG(ICH( - 1)/PJPH( - 1))) + JPH.3 * LOG(ICH( - 1)/(PJPH( - 1))) +
JPH.4 * LOG(HR( - 1)/PJPH( - 1)) + JPH.5 * LOG(JPH( - 1)),

LOG(JPB) - LOG(JPB( - 1)) =
JPB.1 + JPB.2 * (LOG(ICB/PJPB) - LOG(ICB( - 1)/PJPB( - 1))) + JPB.3 * LOG(VYSC( - 1)/PJPB( - 1)) +
JPB.4 * LOG(JPB( - 1)),

LOG(JPTM) - LOG(JPTM( - 1)) =
JPTM.1 + JPTM.2 * (LOG(JPTM( - 1)) - LOG(JPTM( - 2))) + JPTM.3 * (LOG(ICTM/PJPTM) - LOG(ICTM( -
1)/PJPTM( - 1))) + JPTM.4 * LOG(ICTM( - 1)/PJPTM( - 1)) + JPTM.5 * LOG(VYSC( - 1)/PJPTM( - 1)) +
JPTM.6 * LOG(JPTM( - 1)),

LOG(WP/PCP) - LOG(WP( - 1)/PCP( - 1)) =
WP.1 + WP.2 * (LOG(QP) - LOG(QP( - 1))) + WP.3 * (LOG(WP( - 1)/PCP( - 1)) - LOG(QP( - 1))) + WP.4 *
LOG(WG( - 1)) + WP.5 * D9091,

LOG(EP) - LOG(EP( - 1)) =
EP.1 + EP.2 * (LOG(EP( - 1)) - LOG(EP( - 2))) + EP.3 * (LOG(EP( - 1)) - LOG(YP( - 1))) +
EP.4 * LOG(KP( - 2)),

VCPR =
PCPFOO * CPRFOO + PCPCLO * CPRCLO + PCPREN * CPRREN + PCPFUR * CPRFUR +
PCPMED * CPRMED + PCPTRA * CPRTRA + PCPENT * CPRENT + PCPOTH * CPROTH +
PCPABR * CPRABR,

PCPN = 0.07 * PCPFOO + 0.06 * PCPCLO + 0.22 * PCPFUR + 0.01 * PCPTRA + 0.64 * PCPOTH,

GECH12 = VYWG,

GECH3 = GESS - VYT,

GECH4 = VJG,

GROTH = VYID;

CHANGESYM ENDOGENOUS
GECH12 GECH3 GECH4 GROTH PCPN VCPR CPR JPH JPB JPTM WP EP YAG YMI YPS YMA YEW
YCN YTD YTC YRE YFI YCS YGS YBC YOG YPR YID PYFAG PYFMI PYFMA PYFCN PYFTD PYFTC
PYFCS PYFGS CPRFOO CPRCLO CPRREN CPRFUR CPRMED CPRTRA CPRENT CPROTH;

CHANGESYM COEFFICIENT

CPR.1 CPR.2 CPR.3 CPR.4 CPR.5 CPR.6

JPH.1 JPH.2 JPH.3 JPH.4 JPH.5 JPB.1 JPB.2 JPB.3 JPB.4 JPTM.1 JPTM.2 JPTM.3 JPTM.4 JPTM.5 JPTM.6

EP.1 EP.2 EP.3 EP.4  WP.1 WP.2 WP.3 WP.4 WP.5

CPRFOO.1 CPRFOO.2 CPRCLO.1 CPRCLO.2 CPRREN.1 CPRREN.2 CPRFUR.1 CPRFUR.2 CPRMED.1
CPRMED.2 CPRTRA.1 CPRTRA.2 CPRENT.1 CPRENT.2 CPROTH.1 CPROTH.2 CPRABR.1
```

PYFAG.1 PYFAG.2 PYFAG.3 PYFMI.1 PYFMI.2 PYFMI.3 PYFGS.1 PYFGS.2 PYFGS.3 PYFCS.1 PYFCS.1
PYFCS.2 PYFCS.3 PYFCS.4 PYFTD.1 PYFTD.2 PYFTD.3 PYFTD.4 PYFTC.1 PYFTC.2 PYFTC.3 PYFTC.4
PYFMA.1 PYFMA.2 PYFMA.3 PYFMA.4 PYFMA.5 PYFCN.1 PYFCN.2 PYFCN.3 PYFCN.4 PYFCN.5

A.AG.CG A.AG.CPCLO A.AG.CPENT A.AG.CPFOO A.AG.CPFUR A.AG.CPMED A.AG.CPOTH
A.AG.CPREN A.AG.CPABR A.AG.CPTRA A.AG.DS A.AG.JGB A.AG.JGTM A.AG.JOB A.AG.JOTM
A.AG.JPH A.AG.JPB A.AG.JPTM A.AG.XOG A.AG.XPR A.AG.XPS A.AG.XX A.BC.CG A.BC.CPCLO
A.BC.CPENT A.BC.CPFOO A.BC.CPFUR A.BC.CPMED A.BC.CPOTH A.BC.CPREN A.BC.CPABR
A.BC.CPTRA A.BC.DS A.BC.JGB A.BC.JGTM A.BC.JOB A.BC.JOTM A.BC.JPH A.BC.JPB A.BC.JPTM
A.BC.XOG A.BC.XPR A.BC.XPS A.BC.XX A.CN.CG A.CN.CPCLO A.CN.CPENT A.CN.CPFOO
A.CN.CPFUR A.CN.CPMED A.CN.CPOTH A.CN.CPREN A.CN.CPABR A.CN.CPTRA A.CN.DS A.CN.JGB
A.CN.JGTM A.CN.JOB A.CN.JOTM A.CN.JPH A.CN.JPB A.CN.JPTM A.CN.XOG A.CN.XPR A.CN.XPS
A.CN.XX A.CS.CG A.CS.CPCLO A.CS.CPENT A.CS.CPFOO A.CS.CPFUR A.CS.CPMED A.CS.CPOTH
A.CS.CPREN A.CS.CPABR A.CS.CPTRA A.CS.DS A.CS.JGB A.CS.JGTM A.CS.JOB A.CS.JOTM A.CS.JPH
A.CS.JPB A.CS.JPTM A.CS.XOG A.CS.XPR A.CS.XPS A.CS.XX A.EW.CG A.EW.CPCLO A.EW.CPENT
A.EW.CPFOO A.EW.CPFUR A.EW.CPMED A.EW.CPOTH A.EW.CPREN
A.EW.CPABR A.EW.CPTRA A.EW.DS A.EW.JGB A.EW.JGTM A.EW.JOB A.EW.JOTM A.EW.JPH
A.EW.JPB A.EW.JPTM A.EW.XOG A.EW.XPR A.EW.XPS A.EW.XX A.FI.CG A.FI.CPCLO A.FI.CPENT
A.FI.CPFOO A.FI.CPFUR A.FI.CPMED A.FI.CPOTH A.FI.CPREN A.FI.CPABR A.FI.CPTRA A.FI.DS
A.FI.JGB A.FI.JGTM A.FI.JOB A.FI.JOTM A.FI.JPH A.FI.JPB A.FI.JPTM A.FI.XOG A.FI.XPR A.FI.XPS
A.FI.XX A.GS.CG A.GS.CPCLO A.GS.CPENT A.GS.CPFOO A.GS.CPFUR A.GS.CPMED A.GS.CPOTH
A.GS.CPREN A.GS.CPABR A.GS.CPTRA A.GS.DS A.GS.JGB A.GS.JGTM A.GS.JOB A.GS.JOTM
A.GS.JPH A.GS.JPB A.GS.JPTM A.GS.XOG A.GS.XPR A.GS.XPS A.GS.XX A.ID.CG A.ID.CPCLO
A.ID.CPENT A.ID.CPFOO A.ID.CPFUR A.ID.CPMED A.ID.CPOTH A.ID.CPREN A.ID.CPABR
A.ID.CPTRA A.ID.DS A.ID.JGB A.ID.JGTM A.ID.JOB A.ID.JOTM A.ID.JPH A.ID.JPB A.ID.JPTM
A.ID.XOG A.ID.XPR A.ID.XPS A.ID.XX A.M.CG A.M.CPCLO A.M.CPENT A.M.CPFOO A.M.CPFUR
A.M.CPMED A.M.CPOTH A.M.CPREN A.M.CPABR A.M.CPTRA A.M.DS A.M.JGB A.M.JGTM A.M.JOB
A.M.JOTM A.M.JPH A.M.JPB A.M.JPTM A.M.XOG A.M.XPR A.M.XPS A.M.XX A.MA.CG A.MA.CPCLO
A.MA.CPENT A.MA.CPFOO A.MA.CPFUR A.MA.CPMED A.MA.CPOTH A.MA.CPREN A.MA.CPABR
A.MA.CPTRA A.MA.DS A.MA.JGB A.MA.JGTM A.MA.JOB A.MA.JOTM A.MA.JPH A.MA.JPB
A.MA.JPTM A.MA.XOG A.MA.XPR A.MA.XPS A.MA.XX A.MI.CG A.MI.CPCLO A.MI.CPENT
A.MI.CPFOO A.MI.CPFUR A.MI.CPMED A.MI.CPOTH A.MI.CPREN A.MI.CPABR A.MI.CPTRA
A.MI.DS A.MI.JGB A.MI.JGTM A.MI.JOB A.MI.JOTM A.MI.JPH A.MI.JPB A.MI.JPTM A.MI.XOG
A.MI.XPR A.MI.XPS A.MI.XX A.OG.CG A.OG.CPCLO A.OG.CPENT
A.OG.CPFOO A.OG.CPFUR A.OG.CPMED A.OG.CPOTH A.OG.CPREN A.OG.CPABR
A.OG.CPTRA A.OG.DS A.OG.JGB A.OG.JGTM A.OG.JOB A.OG.JOTM A.OG.JPH A.OG.JPB A.OG.JPTM
A.OG.XOG A.OG.XPR A.OG.XPS A.OG.XX A.PR.CG A.PR.CPCLO A.PR.CPENT A.PR.CPFOO
A.PR.CPFUR A.PR.CPMED A.PR.CPOTH A.PR.CPREN A.PR.CPABR A.PR.CPTRA A.PR.DS A.PR.JGB
A.PR.JGTM A.PR.JOB A.PR.JOTM A.PR.JPH A.PR.JPB A.PR.JPTM A.PR.XOG A.PR.XPR A.PR.XPS
A.PR.XX A.PS.CG A.PS.CPCLO A.PS.CPENT A.PS.CPFOO A.PS.CPFUR A.PS.CPMED A.PS.CPOTH
A.PS.CPREN A.PS.CPABR A.PS.CPTRA A.PS.DS A.PS.JGB A.PS.JGTM A.PS.JOB A.PS.JOTM A.PS.JPH
A.PS.JPB A.PS.JPTM A.PS.XOG A.PS.XPR A.PS.XPS A.PS.XX A.RE.CG A.RE.CPCLO A.RE.CPENT
A.RE.CPFOO A.RE.CPFUR A.RE.CPMED
A.RE.CPOTH A.RE.CPREN A.RE.CPABR A.RE.CPTRA A.RE.DS A.RE.JGB A.RE.JGTM A.RE.JOB
A.RE.JOTM A.RE.JPH A.RE.JPB A.RE.JPTM A.RE.XOG A.RE.XPR A.RE.XPS A.RE.XX A.TC.CG
A.TC.CPCLO A.TC.CPENT A.TC.CPFOO A.TC.CPFUR A.TC.CPMED A.TC.CPOTH A.TC.CPREN
A.TC.CPABR A.TC.CPTRA A.TC.DS A.TC.JGB A.TC.JGTM A.TC.JOB A.TC.JOTM A.TC.JPH A.TC.JPB
A.TC.JPTM A.TC.XOG A.TC.XPR A.TC.XPS A.TC.XX A.TD.CG A.TD.CPCLO A.TD.CPENT
A.TD.CPFOO A.TD.CPFUR A.TD.CPMED A.TD.CPOTH A.TD.CPREN A.TD.CPABR A.TD.CPTRA
A.TD.DS A.TD.JGB A.TD.JGTM A.TD.JOB A.TD.JOTM A.TD.JPH A.TD.JPB A.TD.JPTM A.TD.XOG
A.TD.XPR A.TD.XPS A.TD.XX;

filemod;

6. Coefficients

The input/output coefficients in the Implementation Model are developed using a study undertaken by Coopers & Lybrand in 1976. The input/output table were updated, using the so called RAS technique, to the baseyear 1989, then the coefficients were calculated in the usual way. The original matrix had a size of 144*144, but has been aggregated to 16 production sectors.

6.1. IO-coef.inp

```
/* Input file IO-COEF.INP.

/* This input file is run automatically when anyone of the search files are executed. The purpose of the
/* file is to enter the i/o-coefficients into the computers memory. In the equations in the model the i/o-
/* coefficients are represented with a code (a name) instead of their numerical value. The advantage is that
/* we can recognize the coefficient by reading it's name. This requires that the values are available from
/* elsewhere, either from the computers disk or from its memory.

/* The name code is as follows. In, for instance A.AG.CPFOO, the first term "A", which is common for
/* all i/o-coefficients, simply means that this is an i/o-coefficient. The second term represents the
/* delivering sector, "AG" is short for "Agriculture, forestry and fishing". The third term represents the
/* final demand category, "CPFOO" is short for private consumption of "Food, beverage and tobacco".

/* Temporarily changes in the i/o-coefficients should be done inside TROLL using the DO command. If
/* permanent changes are to be done, the old value should be saved inside a comment sign "/*".

/* Delivering sector: Agriculture, forestry and fishing (AG).

DO A.AG.CPFOO =     0.39202198;
DO A.AG.CPCLO =     0.00079937;
DO A.AG.CPREN =     0.04811494;
DO A.AG.CPFUR =     0.00106172;
DO A.AG.CPMED =     0.0006703;
DO A.AG.CPTRA =     0.0040116;
DO A.AG.CPENT =     0.00081619;
DO A.AG.CPOTH =     0.03976969;
DO A.AG.CPABR =     0.01143463;
DO A.AG.JPH =       0.00828638;
DO A.AG.JPB =       0.0082965;
DO A.AG.JPTM =      0.00022799;
DO A.AG.JGB =       0.00026802;
DO A.AG.JGTM =      0.00012764;
DO A.AG.JOB =       0.00085717;
DO A.AG.JOTM =      0.00079249;
DO A.AG.CG =        0.00177865;
DO A.AG.DS =        0.01219288;
DO A.AG.XOG =       0.00002512;
DO A.AG.XPR =       0.00028241;
DO A.AG.XPS =       0.00026449;
DO A.AG.XX =        0.00010207;

/* Delivering sector: Other mining, quarrying (MI).

DO A.MI.CPFOO =     0.00018231;
DO A.MI.CPCLO =     0.00039296;
DO A.MI.CPREN =     0.00855429;
DO A.MI.CPFUR =     0.01632376;
DO A.MI.CPMED =     0.00037974;
DO A.MI.CPTRA =     0.0006973;
```

```
DO A.MI.CPENT =     0.00032689;
DO A.MI.CPOTH =     0.00035297;
DO A.MI.CPABR =     0.0015876;
DO A.MI.JPH =       0.02746371;
DO A.MI.JPB =       0.0274977;
DO A.MI.JPTM =      0.00040948;
DO A.MI.JGB =       0.01024727;
DO A.MI.JGTM =      0.00038867;
DO A.MI.JOB =       0.02837676;
DO A.MI.JOTM =      0.00044058;
DO A.MI.CG =        0.00199301;
DO A.MI.DS =        0.03571405;
DO A.MI.XOG =       0.00012047;
DO A.MI.XPR =       0.00135416;
DO A.MI.XPS =       0.00014678;
DO A.MI.XX =        0.00013468;
```

/* Delivering sector: Petrochemicals (PS).

```
DO A.PS.CPFOO =     0.00000011;
DO A.PS.CPCLO =     0.00000035;
DO A.PS.CPREN =     0.00000008;
DO A.PS.CPFUR =     0.00000025;
DO A.PS.CPMED =     0.0000016;
DO A.PS.CPTRA =     0.00000071;
DO A.PS.CPENT =     0.00000123;
DO A.PS.CPOTH =     0.00000096;
DO A.PS.CPABR =     0.00000004;
DO A.PS.JPH =       0.00000006;
DO A.PS.JPB =       0.00000006;
DO A.PS.JPTM =      0.00000031;
DO A.PS.JGB =       0.00000013;
DO A.PS.JGTM =      0.00000029;
DO A.PS.JOB =       0.00000017;
DO A.PS.JOTM =      0.00000026;
DO A.PS.CG =        0.00000093;
DO A.PS.DS =        0.000001;
DO A.PS.XOG =       0;
DO A.PS.XPR =       0.00000005;
DO A.PS.XPS =       0.46663628;
DO A.PS.XX =        0.00000007;
```

/* Delivering sector: Other manufactering (MA).

```
DO A.MA.CPFOO =     0.02984633;
DO A.MA.CPCLO =     0.08049459;
DO A.MA.CPREN =     0.01910168;
DO A.MA.CPFUR =     0.07137507;
DO A.MA.CPMED =     0.03781427;
DO A.MA.CPTRA =     0.03841395;
DO A.MA.CPENT =     0.05306123;
DO A.MA.CPOTH =     0.04297802;
DO A.MA.CPABR =     0.00767541;
DO A.MA.JPH =       0.01563917;
DO A.MA.JPB =       0.0155398;
DO A.MA.JPTM =      0.09475458;
DO A.MA.JGB =       0.03797371;
DO A.MA.JGTM =      0.09040112;
```

```
DO A.MA.JOB =       0.04910008;
DO A.MA.JOTM =      0.08092999;
DO A.MA.CG =        0.02246667;
DO A.MA.DS =        0.08301042;
DO A.MA.XOG =       0.0004375;
DO A.MA.XPR =       0.00491764;
DO A.MA.XPS =       0.0005834;
DO A.MA.XX =        0.01867876;

/* Delivering sector: Electricity, gas and water (EW).

DO A.EW.CPFOO =     0.00012512;
DO A.EW.CPCLO =     0.00017176;
DO A.EW.CPREN =     0.03200625;
DO A.EW.CPFUR =     0.00024491;
DO A.EW.CPMED =     0.00046707;
DO A.EW.CPTRA =     0.00036578;
DO A.EW.CPENT =     0.00038509;
DO A.EW.CPOTH =     0.00038033;
DO A.EW.CPABR =     0.00037763;
DO A.EW.JPH =       0.00045194;
DO A.EW.JPB =       0.0004524;
DO A.EW.JPTM =      0.00008898;
DO A.EW.JGB =       0.00030294;
DO A.EW.JGTM =      0.00007902;
DO A.EW.JOB =       0.00029546;
DO A.EW.JOTM =      0.00010069;
DO A.EW.CG =        0.00081184;
DO A.EW.DS =        0.00021114;
DO A.EW.XOG =       0.00001812;
DO A.EW.XPR =       0.00020368;
DO A.EW.XPS =       0.00031861;
DO A.EW.XX =        0.00009307;

/* Delivering sector: Construction (CN).

DO A.CN.CPFOO =     0.00203943;
DO A.CN.CPCLO =     0.00284702;
DO A.CN.CPREN =     0.11865225;
DO A.CN.CPFUR =     0.00322974;
DO A.CN.CPMED =     0.00366861;
DO A.CN.CPTRA =     0.01973391;
DO A.CN.CPENT =     0.00353898;
DO A.CN.CPOTH =     0.00585968;
DO A.CN.CPABR =     0.06018779;
DO A.CN.JPH =       0.55795231;
DO A.CN.JPB =       0.55865063;
DO A.CN.JPTM =      0.00193227;
DO A.CN.JGB =       0.4000416;
DO A.CN.JGTM =      0.00176116;
DO A.CN.JOB =       0.18935288;
DO A.CN.JOTM =      0.00506574;
DO A.CN.CG =        0.06595113;
DO A.CN.DS =        0.00184273;
DO A.CN.XOG =       0.0002497;
DO A.CN.XPR =       0.00280666;
DO A.CN.XPS =       0.00347926;
DO A.CN.XX =        0.00149681;
```

/* Delivering sector: Wholesale and retail trade (TD).

```
DO A.TD.CPFOO =     0.16783424;
DO A.TD.CPCLO =     0.15110432;
DO A.TD.CPREN =     0.06828248;
DO A.TD.CPFUR =     0.20614311;
DO A.TD.CPMED =     0.10896181;
DO A.TD.CPTRA =     0.15169407;
DO A.TD.CPENT =     0.14699388;
DO A.TD.CPOTH =     0.24215996;
DO A.TD.CPABR =     0.01582273;
DO A.TD.JPH =       0.03366159;
DO A.TD.JPB =       0.03366866;
DO A.TD.JPTM =      0.02803296;
DO A.TD.JGB =       0.01194083;
DO A.TD.JGTM =      0.00638707;
DO A.TD.JOB =       0.01710962;
DO A.TD.JOTM =      0.01411484;
DO A.TD.CG =        0.02235662;
DO A.TD.DS =        0.00415042;
DO A.TD.XOG =       0.000093;
DO A.TD.XPR =       0.00104535;
DO A.TD.XPS =       0.00063068;
DO A.TD.XX =        0.00177851;
```

/* Delivering sector: Transport and communication (TC).

```
DO A.TC.CPFOO =     0.01136913;
DO A.TC.CPCLO =     0.01141394;
DO A.TC.CPREN =     0.06988455;
DO A.TC.CPFUR =     0.01533114;
DO A.TC.CPMED =     0.01363436;
DO A.TC.CPTRA =     0.17519834;
DO A.TC.CPENT =     0.01387361;
DO A.TC.CPOTH =     0.02590383;
DO A.TC.CPABR =     0.57550814;
DO A.TC.JPH =       0.01360164;
DO A.TC.JPB =       0.01361425;
DO A.TC.JPTM =      0.00355258;
DO A.TC.JGB =       0.00926674;
DO A.TC.JGTM =      0.00240028;
DO A.TC.JOB =       0.03828169;
DO A.TC.JOTM =      0.03499517;
DO A.TC.CG =        0.05031796;
DO A.TC.DS =        0.0035232;
DO A.TC.XOG =       0.00124012;
DO A.TC.XPR =       0.01393929;
DO A.TC.XPS =       0.01326832;
DO A.TC.XX =        0.00424379;
```

/* Delivering sector: Real estate (RE).

```
DO A.RE.CPFOO =     0.00121833;
DO A.RE.CPCLO =     0.00126457;
DO A.RE.CPREN =     0.29431246;
DO A.RE.CPFUR =     0.00159524;
DO A.RE.CPMED =     0.00223898;
DO A.RE.CPTRA =     0.00247145;
```

```
DO A.RE.CPENT =     0.00210568;
DO A.RE.CPOTH =     0.00254934;
DO A.RE.CPABR =     0.0029649;
DO A.RE.JPH =       0.00078696;
DO A.RE.JPB =       0.00078749;
DO A.RE.JPTM =      0.000365;
DO A.RE.JGB =       0.0005289;
DO A.RE.JGTM =      0.00023614;
DO A.RE.JOB =       0.00063042;
DO A.RE.JOTM =      0.00044889;
DO A.RE.CG =        0.00256207;
DO A.RE.DS =        0.00026393;
DO A.RE.XOG =       0.00003877;
DO A.RE.XPR =       0.00043578;
DO A.RE.XPS =       0.00012185;
DO A.RE.XX =        0.00039256;
```

/* Delivering sector: Finance, insurance (FI).

```
DO A.FI.CPFOO =     0.00380953;
DO A.FI.CPCLO =     0.00442505;
DO A.FI.CPREN =     0.02783802;
DO A.FI.CPFUR =     0.00476663;
DO A.FI.CPMED =     0.00672516;
DO A.FI.CPTRA =     0.01125089;
DO A.FI.CPENT =     0.00518839;
DO A.FI.CPOTH =     0.00957143;
DO A.FI.CPABR =     0.02111141;
DO A.FI.JPH =       0.07343386;
DO A.FI.JPB =       0.07350229;
DO A.FI.JPTM =      0.01894927;
DO A.FI.JGB =       0.10644367;
DO A.FI.JGTM =      0.0719444;
DO A.FI.JOB =       0.11909102;
DO A.FI.JOTM =      0.10339684;
DO A.FI.CG =        0.04771929;
DO A.FI.DS =        0.00324811;
DO A.FI.XOG =       0.00191058;
DO A.FI.XPR =       0.02147551;
DO A.FI.XPS =       0.00172549;
DO A.FI.XX =        0.63482821;
```

/* Delivering sector: Community services (CS).

```
DO A.CS.CPFOO =     0.000861;
DO A.CS.CPCLO =     0.02289599;
DO A.CS.CPREN =     0.00247948;
DO A.CS.CPFUR =     0.00137062;
DO A.CS.CPMED =     0.39072126;
DO A.CS.CPTRA =     0.15409886;
DO A.CS.CPENT =     0.28068282;
DO A.CS.CPOTH =     0.21430431;
DO A.CS.CPABR =     0.00280109;
DO A.CS.JPH =       0.00230243;
DO A.CS.JPB =       0.00230453;
DO A.CS.JPTM =      0.00063234;
DO A.CS.JGB =       0.00167834;
DO A.CS.JGTM =      0.00053916;
```

```
DO A.CS.JOB =       0.00137142;
DO A.CS.JOTM =      0.00068068;
DO A.CS.CG =        0.02670153;
DO A.CS.DS =        0.00080391;
DO A.CS.XOG =       0.0007353;
DO A.CS.XPR =       0.00826497;
DO A.CS.XPS =       0.00918766;
DO A.CS.XX =        0.00167779;

/* Delivering sector: Government services (GS).

DO A.GS.CPFOO =     0.00072714;
DO A.GS.CPCLO =     0.00135459;
DO A.GS.CPREN =     0.00060105;
DO A.GS.CPFUR =     0.00167747;
DO A.GS.CPMED =     0.00064288;
DO A.GS.CPTRA =     0.0006638;
DO A.GS.CPENT =     0.00089512;
DO A.GS.CPOTH =     0.00075;
DO A.GS.CPABR =     0.00018188;
DO A.GS.JPH =       0.00108412;
DO A.GS.JPB =       0.00108348;
DO A.GS.JPTM =      0.00159256;
DO A.GS.JGB =       0.00093887;
DO A.GS.JGTM =      0.00151928;
DO A.GS.JOB =       0.00166512;
DO A.GS.JOTM =      0.00136326;
DO A.GS.CG =        0.50417756;
DO A.GS.DS =        0.00245583;
DO A.GS.XOG =       0.00001149;
DO A.GS.XPR =       0.00012917;
DO A.GS.XPS =       0.00001454;
DO A.GS.XX =        0.00031558;

/* Delivering sector: Imputed bank charges (BC).

DO A.BC.CPFOO =     -0.00094129;
DO A.BC.CPCLO =     -0.00109338;
DO A.BC.CPREN =     -0.00687848;
DO A.BC.CPFUR =     -0.00117779;
DO A.BC.CPMED =     -0.00166171;
DO A.BC.CPTRA =     -0.00277998;
DO A.BC.CPENT =     -0.001282;
DO A.BC.CPOTH =     -0.002365;
DO A.BC.CPABR =     -0.00521641;
DO A.BC.JPH =       -0.01814475;
DO A.BC.JPB =       -0.01816164;
DO A.BC.JPTM =      -0.00468217;
DO A.BC.JGB =       -0.02630115;
DO A.BC.JGTM =      -0.01777672;
DO A.BC.JOB =       -0.02942612;
DO A.BC.JOTM =      -0.02554832;
DO A.BC.CG =        -0.01179092;
DO A.BC.DS =        -0.00080257;
DO A.BC.XOG =       -0.00047209;
DO A.BC.XPR =       -0.00530636;
DO A.BC.XPS =       -0.00042273;
DO A.BC.XX =        -0.15685953;
```

/* Delivering sector: Crude oil and natural gas (OG).

DO A.OG.CPFOO = 0.00012452;
DO A.OG.CPCLO = 0.00007456;
DO A.OG.CPREN = 0.00115873;
DO A.OG.CPFUR = 0.00013554;
DO A.OG.CPMED = 0.01853733;
DO A.OG.CPTRA = 0.00317035;
DO A.OG.CPENT = 0.00025155;
DO A.OG.CPOTH = 0.00024326;
DO A.OG.CPABR = 0.00084877;
DO A.OG.JPH = 0.00015832;
DO A.OG.JPB = 0.00015848;
DO A.OG.JPTM = 0.0000319;
DO A.OG.JGB = 0.00011464;
DO A.OG.JGTM = 0.00002805;
DO A.OG.JOB = 0.00012327;
DO A.OG.JOTM = 0.00007629;
DO A.OG.CG = 0.00065182;
DO A.OG.DS = 0.03273798;
DO A.OG.XOG = 0.98974464;
DO A.OG.XPR = 0.22493464;
DO A.OG.XPS = 0.4601753;
DO A.OG.XX = 0.00003917;

/* Delivering sector: Petroleum refining (PR).

DO A.PR.CPFOO = 0.00025207;
DO A.PR.CPCLO = 0.00015036;
DO A.PR.CPREN = 0.00234753;
DO A.PR.CPFUR = 0.00027412;
DO A.PR.CPMED = 0.03755496;
DO A.PR.CPTRA = 0.00642196;
DO A.PR.CPENT = 0.00050719;
DO A.PR.CPOTH = 0.00049094;
DO A.PR.CPABR = 0.0017196;
DO A.PR.JPH = 0.00032065;
DO A.PR.JPB = 0.00032097;
DO A.PR.JPTM = 0.00006401;
DO A.PR.JGB = 0.00023202;
DO A.PR.JGTM = 0.00005625;
DO A.PR.JOB = 0.00024943;
DO A.PR.JOTM = 0.00015405;
DO A.PR.CG = 0.0013188;
DO A.PR.DS = 0.00007988;
DO A.PR.XOG = 0.00000561;
DO A.PR.XPR = 0.45573606;
DO A.PR.XPS = 0.00006094;
DO A.PR.XX = 0.00007923;

/* Delivering sector: Import duties (ID).

DO A.ID.CPFOO = 0.02658697;
DO A.ID.CPCLO = 0.00148186;
DO A.ID.CPREN = 0.07294311;
DO A.ID.CPFUR = 0.00187894;
DO A.ID.CPMED = 0.00273568;
DO A.ID.CPTRA = 0.03140298;

```
DO A.ID.CPENT =     0.00231034;
DO A.ID.CPOTH =     0.00431104;
DO A.ID.CPABR =     0.07102745;
DO A.ID.JPH =       0.00185876;
DO A.ID.JPB =       0.00186007;
DO A.ID.JPTM =      0.0008203;
DO A.ID.JGB =       0.00129966;
DO A.ID.JGTM =      0.00063084;
DO A.ID.JOB =       0.00168958;
DO A.ID.JOTM =      0.00117149;
DO A.ID.CG =        0.01552008;
DO A.ID.DS =        0.00113643;
DO A.ID.XOG =       0.00035911;
DO A.ID.XPR =       0.00403646;
DO A.ID.XPS =       0.00042714;
DO A.ID.XX =        0.001082;

/* Delivering sector: Import (M).

DO A.M.CPFOO =      0.36394308;
DO A.M.CPCLO =      0.72222209;
DO A.M.CPREN =      0.24060159;
DO A.M.CPFUR =      0.67576953;
DO A.M.CPMED =      0.37690773;
DO A.M.CPTRA =      0.40318404;
DO A.M.CPENT =      0.49034379;
DO A.M.CPOTH =      0.41273926;
DO A.M.CPABR =      0.23196738;
DO A.M.JPH =        0.28114284;
DO A.M.JPB =        0.28042432;
DO A.M.JPTM =       0.85322764;
DO A.M.JGB =        0.44502379;
DO A.M.JGTM =       0.84127736;
DO A.M.JOB =        0.58123204;
DO A.M.JOTM =       0.78181706;
DO A.M.CG =         0.24746297;
DO A.M.DS =         0.81943069;
DO A.M.XOG =        0.00548256;
DO A.M.XPR =        0.26574452;
DO A.M.XPS =        0.04338199;
DO A.M.XX =         0.49191723;
```

6.2. Pyf-coef.inp

```
/* Input file PYF-COEF.INP.

/* This input file installs the coefficients used in the "value added prices" in the trade and transport sectors.
/* They are estimated by using an aggregated equation. The file is runned automaticaly with all of the search
/* files. Note that the coefficients are installed only temporarily with the DO-command.

DO PYFTD.1 = -0.60483;
DO PYFTD.2 = 0.77;
DO PYFTD.3 = 0.74858;
DO PYFTD.4 = -0.21719;
DO PYFTC.1 = -0.60483;
DO PYFTC.2 = 0.77;
DO PYFTC.3 = 0.74858;
DO PYFTC.4 = -0.21719;
```

```
/* To go to TROLL command mode.
quit;
```

6.3. Les-coef.inp

```
/* Input file LES-COEF.INP.

/* These coefficients are used in the Linear Expenditure System (LES). The input file is executed
/* automatically by the search files. It installs the LES coefficients temporarily by the DO-command.

DO CPRFOO.1= 30410.02;
DO CPRFOO.2= 0.32;
DO CPRCLO.1= 4122.59;
DO CPRCLO.2= 0.09;
DO CPRREN.1= 3111.58;
DO CPRREN.2= 0.10;
DO CPRFUR.1= 1330.60;
DO CPRFUR.2= 0.09;
DO CPRMED.1= 0;
DO CPRMED.2= 0.01;
DO CPRTRA.1= 0;
DO CPRTRA.2= 0.17;
DO CPRENT.1= 323.37;
DO CPRENT.2= 0.02;
DO CPROTH.1= 0;
DO CPROTH.2= 0.05;
DO CPRABR.1=0;

/* To go to TROLL command mode.
quit;
```

7. Simulating the model

7.1. Extrapolating the variables

Before endogenous variables can be simulated there must exist numerical values for all the exogenous variables for the simulation period. When we perform a historical simulation the values of the exogenous variables are taken from the historical data base, but when we want to simulate the endogenous variables ahead in time the exogenous variables must be given future values, or extrapolated. This chapter refers the programs used for extrapolating the exogenous variables. Because the program files (PRG-files) are in TROLL code, and not readable, we presents the source files (SRC-files) which can be compiled into executable TROLL programs. The source files contain information on how to use the programs.

7.1.1. Forecast.src

```
/* Source file FORECAST.SRC. (Programmed by Rune Johansen, Statistics Norway).

/* A general TROLL program for extrapolation of time series. A time serie can be extrapolated with
/* growth rates based on an existing observation. It is possible to specify many sub-periods with different
/* growth rates.

/* When the program is called it will prompt the user for the name of the variable to extrapolate, number
/* of periods to extrapolate from the last observation, start year of the first sub-period to extrapolate the
/* variable (or END to exit), per cent change in the variable from one period to the next in this sub-period,
/* start year of the next sub-period to extrapolate the variable (or END if finished), per cent change from one
/* year to the next in this sub-period, ... The program will continue to ask for "the start year of the next
```

```
/* sub-period" until the user type "END". This is because many pairs of sub-periods and growth rates are
/* possible.

/* Example: Assume we want to extrapolate the value for government consumption. The last observation is
/* in 1992 and we want to extrapolate 10 years. We want the variable to grow by 1.8 per cent, starting in
/* 1993 with 1996 the last year of this growth rate. Further, from 1998 to 2000, we want the variable to grow
/* by 2.1 per cent, and then, for the rest of the extrapolation period, stay constant (0 per cent growth).

/* There are two ways of providing this information to the FORCAST program: the program can be called
/* in the usual way from the TROLL command line, the user will then be prompted for the input needed to
/* perform the calculations. This method is all right for a few variables, but, as is often the case, when many
/* variables is to be extrapolated, it is better to provide the information from a file. To do this we need to know
/* the exact syntax of the program because we pass over all the information to the program without waiting for
/* the prompt.

/* For the above example it will look like this when the program is called from the TROLL
/* command line:

/* TROLL Command: &forecast
/* Give the name of the time serie to be extrapolated: cg
/* Give the number of periods to extrapolate from the last period: 10
/* Give the start year of the first sub-period to change the variable, or type 'END' to exit: 1993
/* Give the per cent change from one period to the next: 1.8
/* Give the first year of the next sub-period to change the variable, or type 'END' if finished: 1997
/* Give the per cent change from one period to the next: 0
/* Give the next forecasting year, or type 'END' if finished: 1998
/* Give the per cent change from one period to the next: 2.1
/* Give the first year of the next sub-period to change the variable, or type 'END' if finished: 2001
/* Give the per cent change from one period to the next: 0
/* Give the first year of the next sub-period to change the variable, or type 'END' if finished: end

/* When the information for all the variables is passed over from a file, it will look like this for one of them:

/* &forecast; >> cg 10 1993 1.8 1997 0 1998 2.1 2001 0 end

/* Notice that the answers to the prompt in the first alternative is exactly the same as on the line in the
/* second alternative.

addfun main;
procedure main()
begin;
        >>do;delcore all;
        get series"\nGive the name of the time serie to be extrapolated: " ;
        get number num"\nGive the number of periods to extrapolate from the last period: " ;

/* The variable 'num' decides how far beyond the end date of the original series we want to forecast. If
/* the user don't want to forecast beyond the end date of the original series, num may be set equal to zero.

/* 20 years forecasting period.
/* num = 20;

/* "temp" is a temporary time serie where subsequent extrapolated parts of the original series are stored. It is
/* first created as an extension of the original time serie decided by the variable "num".

        >>docore temp = reshape(seq(&(num)+1)*0,enddate(&(series)));
        >>docore temp = overlay(&(series), temp);
        get p2"\nGive the start year of the first sub-period , or type 'END' to exit: ";
```

```
/* The macro is running in a loop until the user type 'END'.

        while(p2 <>"END")
                begin;
                p1=convert(p2, "numeric");
                year = p1-1;
                get number fac"Give the per cent change from one period to the next:";
                fac2=(1+fac/100);
                on warning nomsg;
                on error nomsg;

/* The extrapolation is done by the 'autocum' function.

                >>docore temp = autocum(temp,0,&(year)a,0,&(fac2));
                on error nomsg;
                get p2"Give the first year of the next sub-period, or type 'END' if finished: ";
        end;

/* The extrapolatioin is completed, and the temporary series is copied to a new series with the same name as
/* the original series, but belonging to a data base specified by the search file.

        >>dofile &(series) = temp;
        >>delcore all;

/* print("Extrapolation is finished.");

end;
```

7.1.2. Gorecast.src

```
/* Source file GORECAST.SRC. (Programmed by Rune Johansen, Statistics Norway).

/* Troll program for extrapolation of time series. This program is more robust than the FORECAST program,
/* but it runs more slowly. If the FORECAST program is used twice, the time series will be extrapolated
/* twice. The GORECAST program will always start at the specified date (1990 in the previous program).

addfun main;
procedure main()
begin;
        >>do;delcore all;

        get series"\nGive the name of the timeseries to be forecasted: ";
        get number aar2"\nGive the latest year for entering data: ";

/* The variable 'num' decides how far beyond the end date of the original series we want to forecast. If
/* you don't want to forecast beyond the end date of the original series, you may set num equal to zero.

/* 20 years extrapolation period.
/* num = 20;

/* 'temp' is a temporary time serie where subsequent extrapolated parts of the original serie are stored.

/* First we create 'temp' as an extension of the original serie decided by the variable 'num'.

num=aar2-1990;

        >>docore en  = reshape((seq(&(num)+1)*0)+1,1989a);
        >>docore &(series)=&(series)*en;
        >>docore temp = reshape(seq(&(num)+1)*0,1990a);
```

```
        >>docore temp = overlay(&(series), temp);

        get p1"\nGive the first year of extrapolation, or type 'END' if finished: ";

/* The program is running in a loop until the parameter is 'END'.

        while(p1 <> "END")
        begin;
                p0=convert(p1, "numeric");
                year = p0-1;
                get number fac"\nGive the per cent growth rate: ";
                >>do y=values(temp,&(year)A);

/* If the initial level of the series is < 0, then the factor is given the opposite sign. Otherwise, a negative
/* annual change to a negative value, would give a positive change, due tothe autocum function.

                x = getdata("Y",1);
                if (x < 0) then fac= -fac;
                fac2=(1+fac/100);
                on warning nomsg;
                on error nomsg;

                >>docore temp = autocum(temp,0,&(year)a,0,&(fac2));
                on error nomsg;
                get p1"\nGive the next forecasting year, or type 'END' if finished: ";
        end;

/* The extrapolation is completed, and the temporary serie is copied to a new serie with the same name as
/* the original series, but belonging to a data base specified by the search rules.

        >>dofile &(series) = temp;
        >>delcore all;

Print("");

/* print("Finished with forecasting.");

end;
```

7.1.3. Extrap.src

```
/* Source file EXTRAP.SRC.

/* This file is used to extrapolate the exogenous variables. It contains a list of all this variables,
/* including the residuals. This program call for two other programs. For the exogenous variable,
/* exclusive econometric residuals, the program FORECAST is called, and the information is passed
/* to it.

/* As an example: we want to extrapolate a variable CG 20 years, starting in 1991, with 0 per cent
/* growth. The information is CG 20 1991 0 end, where CG is the variable name, 20 means 20 year of
/* extrapolation, 1991 means start year, 0 means percent growth and end means that we are finished with
/* entering. The "end" command is necessary because many pairs of "years" and "per cent growth" is possible.

/* See inside the program called from this program, FORECAST, for more detailed information.

/* For the econometric residuals another program, FOREECON, is called. This is because we want to control
/* these variables in another way. We want to be able to set the levels of the variables instead of the growth
/* rates. The program is similar except of that we set levels instead of growth rates.
```

```
/* Note that this file is just an example of one way of extrapolating the exogenous variable. This means
/* that when we changes the growth rate of one or more of the variables (another policy) it should be
/* saved with another name.

addfun main;
procedure main()
begin;

/* Here the exogenous variables are "passed over" to the program FORECAST.

&FORECAST; >>CG 20 1991 0 end
&FORECAST; >>CPN 20 1991 0 end
&FORECAST; >>D9091 20 1991 0 end
&FORECAST; >>DKPRATE 20 1991 0 end
&FORECAST; >>DS 20 1991 0 end
&FORECAST; >>ENG 20 1991 0 end
&FORECAST; >>ENP 20 1991 0 end
&FORECAST; >>GESS 20 1991 0 end
&FORECAST; >>GROSHARE 20 1991 0 end
&FORECAST; >>ICB 20 1991 0 end
&FORECAST; >>ICH 20 1991 0 end
&FORECAST; >>ICTM 20 1991 0 end
&FORECAST; >>JGB 20 1991 0 end
&FORECAST; >>JGTM 20 1991 0 end
&FORECAST; >>JOB 20 1991 0 end
&FORECAST; >>JOTM 20 1991 0 end
&FORECAST; >>LIABP 20 1991 0 end
&FORECAST; >>LSM 20 1991 0 end
&FORECAST; >>LSW 20 1991 0 end
&FORECAST; >>M0 20 1991 0 end
&FORECAST; >>M2 20 1991 0 end
&FORECAST; >>MS 20 1991 0 end
&FORECAST; >>PM 20 1991 0 end
&FORECAST; >>POIL 20 1991 0 end
&FORECAST; >>PYFBC 20 1991 0 end
&FORECAST; >>PYFEW 20 1991 0 end
&FORECAST; >>PYFFI 20 1991 0 end
&FORECAST; >>PYFOG 20 1991 0 end
&FORECAST; >>PYFPR 20 1991 0 end
&FORECAST; >>PYFPS 20 1991 0 end
&FORECAST; >>PYFRE 20 1991 0 end
&FORECAST; >>PYG 20 1991 0 end
&FORECAST; >>PYID 20 1991 0 end
&FORECAST; >>QG 20 1991 0 end
&FORECAST; >>TAG 20 1991 0 end
&FORECAST; >>TBC 20 1991 0 end
&FORECAST; >>TCN 20 1991 0 end
&FORECAST; >>TCS 20 1991 0 end
&FORECAST; >>TEW 20 1991 0 end
&FORECAST; >>TFI 20 1991 0 end
&FORECAST; >>TGS 20 1991 0 end
&FORECAST; >>THR 20 1991 0 end
&FORECAST; >>TMA 20 1991 0 end
&FORECAST; >>TMI 20 1991 0 end
&FORECAST; >>TOG 20 1991 0 end
&FORECAST; >>TPR 20 1991 0 end
&FORECAST; >>TPS 20 1991 0 end
&FORECAST; >>TRE 20 1991 0 end
```

```
&FORECAST; >>TTC 20 1991 0 end
&FORECAST; >>TTD 20 1991 0 end
&FORECAST; >>VYSSHARE 20 1991 0 end
&FORECAST; >>VYSO 20 1991 0 end
&FORECAST; >>VYWO 20 1991 0 end
&FORECAST; >>WG 20 1991 0 end
&FORECAST; >>XPS 20 1991 0 end
&FORECAST; >>XX 20 1991 0 end
&FORECAST; >>YOG 20 1991 0 end
&FORECAST; >>YPR 20 1991 0 end
&FORECAST; >>ZR 20 1991 0 end

/* Here the residuals are "passed over" to the program FORECAST.

&FORECAST ; >> RCPRCLO 20 1991 0 end
&FORECAST ; >> RCPRENT 20 1991 0 end
&FORECAST ; >> RCPRFOO 20 1991 0 end
&FORECAST ; >> RCPRFUR 20 1991 0 end
&FORECAST ; >> RCPRMED 20 1991 0 end
&FORECAST ; >> RCPROTH 20 1991 0 end
&FORECAST ; >> RCPRREN 20 1991 0 end
&FORECAST ; >> RCPRTRA 20 1991 0 end
&FORECAST ; >> RGECH12 20 1991 0 end
&FORECAST ; >> RGECH3 20 1991 0 end
&FORECAST ; >> RGECH4 20 1991 0 end
&FORECAST ; >> RGROTH 20 1991 0 end
&FORECAST ; >> RPCG 20 1991 0 end
&FORECAST ; >> RPCPABR 20 1991 0 end
&FORECAST ; >> RPCPCLO 20 1991 0 end
&FORECAST ; >> RPCPENT 20 1991 0 end
&FORECAST ; >> RPCPFOO 20 1991 0 end
&FORECAST ; >> RPCPFUR 20 1991 0 end
&FORECAST ; >> RPCPMED 20 1991 0 end
&FORECAST ; >> RPCPN 20 1991 0 end
&FORECAST ; >> RPCPOTH 20 1991 0 end
&FORECAST ; >> RPCPREN 20 1991 0 end
&FORECAST ; >> RPCPTRA 20 1991 0 end
&FORECAST ; >> RPJGB 20 1991 0 end
&FORECAST ; >> RPJGTM 20 1991 0 end
&FORECAST ; >> RPJOB 20 1991 0 end
&FORECAST ; >> RPJOTM 20 1991 0 end
&FORECAST ; >> RPJPB 20 1991 0 end
&FORECAST ; >> RPJPH 20 1991 0 end
&FORECAST ; >> RPJPTM 20 1991 0 end
&FORECAST ; >> RPXOG 20 1991 0 end
&FORECAST ; >> RPXPR 20 1991 0 end
&FORECAST ; >> RPXPS 20 1991 0 end
&FORECAST ; >> RPXX 20 1991 0 end
&FORECAST ; >> RVCPR 20 1991 0 end
&FORECAST ; >> RYAG 20 1991 0 end
&FORECAST ; >> RYBC 20 1991 0 end
&FORECAST ; >> RYCN 20 1991 0 end
&FORECAST ; >> RYCS 20 1991 0 end
&FORECAST ; >> RYEW 20 1991 0 end
&FORECAST ; >> RYFI 20 1991 0 end
&FORECAST ; >> RYGS 20 1991 0 end
&FORECAST ; >> RYID 20 1991 0 end
&FORECAST ; >> RYMA 20 1991 0 end
```

```
&FORECAST ; >> RYMI 20 1991 0 end
&FORECAST ; >> RYOG 20 1991 0 end
&FORECAST ; >> RYPR 20 1991 0 end
&FORECAST ; >> RYPS 20 1991 0 end
&FORECAST ; >> RYRE 20 1991 0 end
&FORECAST ; >> RYTC 20 1991 0 end
&FORECAST ; >> RYTD 20 1991 0 end

/* Here the econometric residuals are "passed over" to the program FOREECON.

&FOREECON; >> RCPR 1991 0 20 end
&FOREECON; >> REP 1991 0 20 end
&FOREECON; >> RJPH 1991 0 20 end
&FOREECON; >> RJPB 1991 0 20 end
&FOREECON; >> RJPTM 1991 0 20 end
&FOREECON; >> RPYFAG 1991 0 20 end
&FOREECON; >> RPYFCN 1991 0 20 end
&FOREECON; >> RPYFCS 1991 0 20 end
&FOREECON; >> RPYFGS 1991 0 20 end
&FOREECON; >> RPYFMA 1991 0 20 end
&FOREECON; >> RPYFMI 1991 0 20 end
&FOREECON; >> RPYFTC 1991 0 20 end
&FOREECON; >> RPYFTD 1991 0 20 end
&FOREECON; >> RWP 1991 0 20 end

print("");
print("Finished with extrapolating.");
print("");

end;
```

7.1.4. Foreecon.src

```
/* Source file FOREECON.SRC. (Programmed by Rune Johansen, Statistics Norway).

/* Program that is used to set levels of variables ahead in time, instead of growth rates. When the
/* extrapolation is completed, the temporary serie is copied to a new serie with the same name as the
/* original serie, but stored in the data base specified by the search rules.

addfun main;
procedure main()
begin;

get series"\nGive the name of the time serie to be extrapolated: ";

/* 'temp' is a temporary time serie where subsequent extrapolated parts of the original serie is stored.

>>docore temp = &(series);

get year"\nGive the start year of the first extrapolation sub-period, or type 'END' to exit: ";

while (year <> "END")
        begin;
                get number val"\nGive the value (level) to extrapolate the variable with: ";
                get number num"\nGive the number of extrapolation years: ";
                >>docore temp2 = reshape(&(val)+seq(&(num))*0,&(year)a);
                >>docore temp3 = overlay(temp2, temp);
                >>docore temp = temp3;
                get year"\nGive the start year of the next extrapolation period, or type 'END' if finished.";
```

```
        end;

        >>dofile &(series) = temp;

end;
```

7.1.5. Alt1ref1.src

```
/* Source file ALT1REF1.SRC. (Progrmmed by Rune Johansen, Statistic Norway).

/* This program is used for changing one or more of the exogenous variables from the reference path, to
/* make an alternative scenario. It passes information about the exogenous variables to the program DEVIAT,
/* where they are given shift in user specified sub-periods.

/* Example: Assume we have already extrapolated the exogenous variables, and made a reference simulation
/* with these as input for the period 1990 to 2010. In this extrapolation, and thus as input to the reference
/* simulation, the government consumption was extrapolated with a 0 per cent growth rate. We are interessed
/* in studying the effects of government consumption growing 2.3 percent in the period 1998 to 2003. This will
/* be our alternative scenario. The necessary information passed over to the program DEVIAT with the
/* following syntax: CG 1998 2003 2.3 end

/* The 'END' statment is needed because it indicates that we are finished entering pairs of sub-periods and
/* growth rates relative to the reference scenario (in this example there is only one pair).

/* The variable CG will be extrapolated in the same way as it was as input to the reference simulation, apart
/* from the period 1998 - 2003, where it will stay 2.3 per cent above the extrapolated variable used in the
/* reference simulation. The shift will be from 1997 to 1998, so that 1998 is the first year CG is 2.3 per cent
/* higher. Thereafter, until 2003, CG will grow by 0 per cent, or, it will stay constant 2.3 per cent above than
/* in the reference case (paralell). In 2004 CG will «be back» to the reference value.

/* Notice that the name of this file (source file) is arbitrary, a different scenario should be given a different
/* name.

addfun main;
procedure main()
begin;

        &deviat; >> cg 1998 2003 2.3 end

        print("");
        print("Finished changing exogenous variables.");
        print("");

end;
```

7.1.6. Deviat.src

```
/* Source file DEVIAT.SRC. (Programmed by Rune Johansen, Statistic Norway).

/* This program makes changes in variables over user specified sub-periods. The main purpose of the program
/* is to change (extrapolated values of) exogenous variables to be used in simulations.

/* Example: Assume there exist a time serie CG which is extrapolated from 1990 to 2010 with 1.2 per cent
/* growth. This could be input to a reference simulation. We want to study the effects of a 2 per cent growth,
/* rather than 1.2, in the sub-period 1998 - 2003.

/* In TROLL this example would look like this:

/* TROLL Command: &deviat
/* Give the name of the time serie to change: cg
```

```
/* Give the first year of the sub-period to change the variable, or type 'END' to exit: 1995
/* Give the last year of this sub-period: 2000
/* Give the per cent change: 10
/* Give the start year of the next sub-period, or type 'END' if finished: end

/* This example will increase CG from 1994 to 1995 by 10 per cent. CG will then stay at this level
/* until 2000, and, in year 2001, it will «be back» to the previous value.

/* It should be noticed that multiple pairs of sub-periods and per cent growth are possible.

addfun main;
procedure main()
begin;

        >>do;delcore all;
        get series"\nGive the name of the time serie to change: ";

/* Make a variablename 'temp', where subsequent parts parts of the original series are temporarily stored.

>>docore temp = &(series);

get p1"\nGive the first year of the sub-period to change the variable, or type 'END' to exit: ";

/* The program is running in a loop until the user type 'END'.

        while(P1<> "END")
                begin;
                year1 = p1;
                get year2"\nGive the last year of this sub-period: ";
                get number percent"\nGive the per cent change: ";
                on warning nomsg;
                on error nomsg;
                >>docore temp2 =
                >>((100+&(percent))/100)*subrange(temp,&(year1)a,&(year2)a);
                >>docore temp3 = subrange(temp,startdate(&(series)),&(year1)a);
                >>docore temp4 = subrange(temp,&(year2)a,enddate(&(series)));
                >>docore temp = overlay(temp2, temp3, temp4);
                on error nomsg;
                get p1"\n Give the start year of the next sub-period, or type 'END' if finished: ";
        end;

/* The new time serie is stored under it's original name, but at the data base specified by the search file.

        >>dofile &(series) = temp;
        >>delcore all;

/* print("Finished with changing exogenous variable");

end;
```

7.1.7. Changexa.src

```
/* Source file CHANGEXA.SRC. (Programmed by Rune Johansen and Einar Bowitz, Statistics Norway).

/* This program makes absolute changes in variables over user specified sub-periods. The user gives
/* variable name, start year of first sub-period, end year of first sub-period, and absolute change in values for
/* that period, start year of next sub-period, end year of next sub-period, absolut change in this sub-period, ....
/* The user type 'END' if he don't want to specify another sub-period (start year and end year). So multiple
/* sub-periods and changes in leves are allowed.
```

```
/* The change in the variables is only kept in the troll memory and will be deleted when leaving troll or
/* by typing delsave all.

addfun main;
procedure main()
begin;
        >>do; delcore all;
        get series"\nGive the name of the time serie to change: ";

/* 'temp' is a temporary timeseries where subsequent parts parts of the original series are stored.

        >>docore temp = &(series);
        get p1"\nGive the start year of the first sub-period to change the variable, or type 'END' to exit: ";

/* The macro is running in a loop until the user types 'END'.

while(p1 <> "END")
        begin;
                year1 = p1;
                get year2"\nGive the last year of this sub-period: ";
                get number absol"\nGive the absolute change: ";
                on warning nomsg;
                on error nomsg;
                >>docore temp2 =
                >> &(absol)+subrange(temp,&(year1)a,&(year2)a);
                >>docore temp3 = subrange(temp,startdate(&(series)),&(year1)a);
                >>docore temp4 = subrange(temp,&(year2)a,enddate(&(series)));
                >>docore temp = overlay(temp2, temp3, temp4);
                on error nomsg;
        get p1"\nGive the start year of the next sub-period to change the variable, or type 'END' if finished:";

        end;

        >>do &(series) = temp;
        >>delcore all;

/* print("Finished changing the variable.");

end;
```

7.1.8. Changexp.src

```
/* Source file CHANGEXP.SRC.

/* Program that makes changes in variables over user specified sub-periods. The user gives variable
/* name, start year of sub-period, end year of sub-period, per cent change in values for that period, and, if
/* finished the user type 'END'. The 'END' is necessary because many pairs of sub-periods and per cent
/* growth is allowed.

/* The changes is only kept in the TROLL memory and will be deleted when leaving TROLL or by typing
/* delsave all.

addfun main;
procedure main()
begin;

        >>do;delcore all;
        get series"\nGive the name of the time serie to change: ";
```

```
/* 'temp' is a temporary timeseries where subsequent parts parts of the original series are stored.

        >>docore temp = &(series);

        get p1"\nGive the start year of the first sub-period to change the variable, or type 'END' to exit: ";

/* The macro is running in a loop until the user type 'END'.

        while(p1 <> "END")
        begin;
                year1 = p1;
                get year2"\nGive the last year of this sub-period: ";
                get number percent"\nGive the per cent change: ";
                on warning nomsg;
                on error nomsg;
                >>docore temp2 =
                >>((100+&(percent))/100)*subrange(temp,&(year1)a,&(year2)a);
                >>docore temp3 = subrange(temp,startdate(&(series)),&(year1)a);
                >>docore temp4 = subrange(temp,&(year2)a,enddate(&(series)));
                >>docore temp = overlay(temp2, temp3, temp4);
                on error nomsg;
        get p1"\nGive the start year of the next sub-period to change the variable, or type 'END' if finished: ";

        end;

        >>do &(series) = temp;

        >>delcore all;

/* print("Finished with changing the variable.");

end;
```

7.2. Simulating the variables

The previous section presented the program files used for extrapolation of, and to make change in, the exogenous variables. When the extrapolation is completed, this variables will be used as input to a simulation model. This section presents the main programs developed for organising the simulations.

7.2.1. Refsim.src

```
/* Source file REFSIM.SRC.

/* This is the main program to organize the reference simulations. The program requires that the program used
/* to extrapolate the exogenous variables have been prepared in advance, and that it is ready to be called from
/* this program.

/* The program ask for which model to use, the name of the file (program) containing the exogenous variables
/* to extrapolate, and the start and end year of the simulation period.

/* This program compile and execute the program used to extrapolate the exogenous variables. Then these
/* variables are used as input to the model, which is used to simulate the endogenous variables for the specified
/* period.

/* The program automatically gives search to the directory for the simulation output. The results will be saved
/* in a formdata file at this directory. The name of this file will be the same as of the file used to extrapolate the
/* exogenous variables, but it will have extension DAT.
```

```
addfun main;
procedure main()
begin;

/* First we delete all searches and accesses eventually given, before we give the correct ones.

        >>delaccess all;
        >>delsearch all;
        >>input accessim;
        >>input srchsimu

/* We ask for the names to be used.

        get modname"\nGive the name of the model: ";
        get refname"\nGive the name of the file containing the exogenous variables to be extrapolated: ";
        get stperiod"\nGive the start year of the simulation period (four digits only ): ";
        get endperiod"\nGive the end year of the simulation period (four digits only ): ";

/* We open the data base for the simulation output, and create a new formdata file with the same name
/* as the file that generates the reference path. The internal name of this data base is REF.

        >>access ref type formdata id d:\saudi\im\simres\&(refname).dat mode create;

/* Here we give writeable search to this formdata file, so that the simulation result will be store here.
        >>Search data ref w;

/* Here we give search to the historical data base, to be used when extrapolating the exogenous variables.
        >>search first data imtim;

        >>compile &(refname);
        &(refname);
        >>search first data ref w;
        >>usemod &(modname);
        >>simulate;
        >>simstart &(stperiod)a;
        >>dotil &(endperiod)a;
        >>filesim &(refname);
        >>quit;
print("");
        print("Finished with simulation.");
        print("The reference simulation is saved in D:\\SAUDI\\IM\\SIMRES\\",refname, ".DAT.\nwith the
prefix ",refname);
print("");

end;
```

7.2.2. Altsim.src

```
/* Source file ALTSIM.SRC.

/* Main program that organizes the simulations scenarios. Scenarios is defined as deviations from a reference
/* path due to changes in one or more of the exogenous variables.

/* This program requires an existing reference path (made for instance by the program REFSIM), and that a file
/* (program) which will be used for making change in one or more of the exogenous variables, has been
/* prepared.

/* The program ask the user for model name, the name of the reference path, the name of the alternative
/* scenario, and the start and end year of the simulation period.
```

```
/* When the necessary information has been providedthe reference simulation is copied to a new name, then
/* the changes in the exogenous variables are undertaken and the endogenous variables are simulated.

addfun main;
procedure main()
begin;

        >>delsearch all;
        >>delaccess all;
        >>input accessim;
        >>input srchtime;

        get modname"\nGive the name of the model: ";
        get refname"\nGive the name of the reference path: ";
        get sn"\nGive the name of the alternative scenario: ";
        get stperiod"\nGive the start year of the simulation period (four digits only): ";
        get endperiod"Give the end year of the simulation period (four digits only): ";

>>host "command.com /c copy d:\\saudi\\im\\simres\\&(refname).dat d:\\saudi\\im\\simres\\&(sn).dat";

/* Simulation input and output are stored here.
        >>access senn type formdata id d:\saudi\im\simres\&(sn).dat mode w;

/* The reference simlation is stored here (the reference path).
        >> access ref type formdata id d:\saudi\im\simres\&(refname).dat mode r;

        >>Search data senn w;
        >>compile &(sn);

/* Call macro that contains exogenous variables that is changed.
        &(sn);

        >> usemod &(modname);
        >> simulate;
        >> simstart &(stperiod)a; dotil &(endperiod)a;
        >> filesim &(sn);

        >>quit;

        print("");
        print("End of simulation.");
        print("The simulation results are stored in D:\\SAUDI\\IM\\SIMRES\\", sn, ".DAT." );
        print("The variables in the reference simulation has the prefix ", refname, " while the variables in the
alternative simulation has the prefix ", sn,".");

        print("");

end;
```

7.2.3. Sim.src

```
/* Source file SIM.SRC. (Programmed by Robin Choudhury, Statistics Norway).

/* The purpose of this program is to prompt the user for the information needed to perform both
/* a reference and an alternative simulation. This information is: a file name to save the result in,
/* the name of the file (program) containing the exogenous variables to extrapolate, the model name, the
/* start and end year of the simulation period, the name of the file (program) containing the variable(s) to
/* shift.
```

```
/* What distinguishes this program from the other simulation programs, is that it will save the results in a
/* user specified file (formdata), and that it performs both a reference and an alternative simulation.

addfun main;
procedure main()
begin;

        get file"\nGive a file name to save simulations results in (max. 8 characters, no extension): ";

        >>access rrr type formdata id d:\saudi\im\simres\&(file).dat mode w;
        >>search data rrr w;

        get refname"\nGive the name of the file containing the exogenous variables to extrapolate: ";

        >>option screen off;
        >>compile &(refname);
        &(refname);
        >>option screen on;

        get modname"\nGive the name of the model: ";

        print("");

        >>usemod &(modname);
        >>simulate;

        print("");

        get first"\nGive the first year of the simulation period: ";
        get last"\nGive the last year of the simulation period: ";
        get altname"\nGive the name of the file containing the exogenous variable(s) to shift: ";

        print("");

>>option screen off;

        >>simulate;
        >>simstart &(first)a;
        >>dotil &(last)a;
        >>filesim &(refname);

        >>compile &(altname);
        &(altname);
        >>simulate;
        >>simstart &(first)a;
        >>dotil &(last)a;
        >>filesim &(altname);

>>option screen on;

        print("");

        print("End of simulations.");
        print("The simulations results are saved as D:\\SAUDI\\IM\\SIMRES\\", file,".DAT.");
        print("The variables simulated using the file: ", refname,".PRG has got prefix ", refname,".");
        print("The variables simulated using the file: ", altname,".PRG has got prefix ", altname,".");

        print("");
```

```
        >>quit;

end;
```

7.3. Printing results to screen

TROLL has built in programs for presenting the different dataobjects to screen. However, there have been made some programs that more easily recognise what variables we want to print and where to locate them.

7.3.1. Prtref.src

```
/* Source file prtref.src.

/* This program prints output from a simulation. The only information needed is the name of the
/* simulation. The program prompt the user for the name of the variable, and when program
/* REFSIM has been used the simulation has the same first name as the file extrapolating the
/* exogenous variables. The simulated variables has a prefix with the same name, but the user shall
/* not give this prefix, only «original» variable name.

/* The program print out the value and the per cent change in the variable from last period.

addfun main ;
procedure main()

addsym rs va;
begin;
        on warning nomsg;
        get rs "Give the name of reference simulation: " ;

        >> access rssea type formdata id d:\saudi\im\simres\&(rs).dat mode r;
        >> search FIRST data rssea ;

        start1:
                get va "Give the name of the variable (without prefix), or type 'END' if finished: ";
                if (va <> "END") then
                begin;
                >> do prt.(truncate(&(rs)_&(va),3));
                >> do print("Per cent change from last period is: ");
                >> do prt.(truncate(100*(&(rs)_&(va)/&(rs)_&(va)(-1)-1),3));
        end;
        else
        goto start2;
goto start1;
start2:

>> delsearch rssea ;
>> delaccess rssea ;
>> quit;

end;
```

7.4. Miscellaneous programs

7.4.1. Eqeval.src

```
/* Source file EQEVAL.SRC. (Programmed by Robin Choudhury, Statistics Norway).

/* The eqeval program evaluates the equations in a model by calling the built in eqeval TROLL function.
```

```
/* This is very useful to see that no errors prevent the left hand sides to be equal to the right hand sides. The
/* program prompt the user for: the model name, the number of the first equation, the number of the last
/* equation, and one of three possible choices: evaluation of the right hand side, the left hand side or the
/* residuals.

addfun main;
procedure main()
begin;

        on warning nomsg;
        get modname"\nGive the name of the model: ";
        get number eqfrom"\nGive the number of the first equation: " ;
        get number eqto"\nGive the number of the last equation: ";

        start1:

get code"\nType '0' if you want to evaluate the right hand side, '1' for the left hand side or '2' for residuals: ";

                if (code <> "0" and code <> "1" and code <> "2") then
                begin;
                print(" ");

                print("ERROR. Not an option.");

                /* Retype if the choice is not 0, 1 or 2.
                goto start1;
        end;

        /* This is to make two extra line feed.
        print("");
        print("");

        >>usemod &(modname);

        if (code == "0") then
        print("Evaluation of the right hand side: ");

        else if (code == "1") then
        print("Evaluation of the left hand side: ");

        else if (code == "2") then
        print("Evaluation of the residuals: ");


        for(i= eqfrom; i<= eqto; i=i+1)
        begin;
        >> do prt.( eqeval(&(i), &(code) ) );

        end;

print("\nFinished with eqeval.");

end;
```

7.4.2. Db.src

```
/* Source file DB.SRC. (Programmed by Robin Choudhury and Knut A. Magnussen, Statistics Norway).

/* Program to open an unaccessed data base.
```

```
/* When a simulation is performed and the results are saved in the data base, we are given temporarily
/* access and search to this. But as soon as we stop TROLL or type delaccess all anddelsearch all we loose
/* this access and search. This program can be used to avoid typing the long access and search commands.

addfun main;
procedure main()
begin;

        get data base"Give the name of the data base to open (no extension): ";
        get nickname"Give a nickname for the data base to open: ";

        >>access &(nickname) type formdata id d:\saudi\im\simres\&(data base).dat mode w;
        >>search data &(nickname) w;

end;
```

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Annex A: Examples on simulating the model

In these examples we assume that there exists a model that is ready for simulation. In short this means that the model is mathematically consistent and that data exist for all coefficients and variables. We also assume, as is the case in the Implementation Model, that there exist historical time series for all variables. Given this situation there are many ways of simulating the model. We can perform a historical simulation, to check how the model tracks the history, using historical values for the exogenous variables as input, or we can simulate ahead in time (forecasting) using extrapolated values of exogenous variables as input.

Example 1: Historical simulation

The following session display the session window in TROLL, which shows the commands given (and TROLL's response) to perform a historical simulation. We first run the access file common for all the

```
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TROLL Command: input accessim
TROLL Command: option screen off;
TROLL Command: input srchsimu
TROLL Command: option screen off;
TROLL Command: usemod im95;
TROLL Command: simulate;
Analyzing Model's Incidence Matrix
Analyzing Model's Block Structure
Generating Simulation Code
Use FILEMOD or SAVEMOD before USEMOD to save code.
Simulations can start from 1973A to 1991A and must end by 1991A.
SIMULATE Command: simstart 1973a;
SIMULATE Command: dotil 1991a;
SIMULATE Command: filesim example;

DO Command: do prt.(example_cpfoo);

EXAMPLE_CPFOO:
  Numeric scalar timeseries --
  Time dimension: Periodicity 1, 1973A to 1991A (19 observations)

     Time dimension -->
1973A :   7506.996536   9188.232264   10925.144146   12380.554655
1977A :   16504.214491  24205.87182   33248.430285   37950.495602
1981A :   43250.754945  54576.132822  61272.76479    59909.896957
1985A :   62675.417367  55016.030284  54351.087809   53729.928199
1989A :   52272.008464  56591.912813  56355.714106
```

data bases. We then run the input file that gives writeable search for datatype «DATA» to the directory for simulation output. The command «option screen off» is given from the input files because inside these files (on the top of them) we have instructed TROLL not to display the commandos in the files on screen. The result will be stored in the file d:\saudi\im\simres\simout.dat. The next command specify which model to use.

The simulate command initiates a simultaneous simulation of the working model. The models incidence matrix and its block structure are analyzed and saved as a code. An «incidence matrix» identifies which current endogenous variables appears in which equation. The models «block structure» consists of the smallest possible blocks of truly simultaneous equations. The simulation code tells how to normalize the model, or which equation(s) should be used to solve for which variable(s).

TROLL will display the period for which the model can be simulated. In this example we can start simulation in any year between 1973 and 1991. The simulation must end by 1991. We simulate the model from 1973 to 1991 (the maximum period), then we save the result as «example». This means that all the simulated variables will be stored with the prefix «example». Then we print out the simulated value for the variable CPFOO, which is stored as EXAMPLE_CPFOO.

Example 2: Forecasting 1

In this example we will perform a simulation on extrapolated exogenous variables. To give a better idea of what is going on we do it «manually», this means simulating without utilising the programs simplify the routines.

```
TROLL Release 0.94
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TROLL Command: input accessim
TROLL Command: option screen off;
TROLL Command: input srchsimu
TROLL Command: option screen off;
TROLL Command: usemod im95
TROLL Command: compile extrap

   TROLL Compiler: rel. 0.933

    END OF COMPILATION
  ERRORS:  0
  WARNINGS: 0
TROLL Command: &extrap

Finished with extrapolating.

DO Command: simulate;
Analyzing Model's Incidence Matrix
Analyzing Model's Block Structure
Generating Simulation Code
Use FILEMOD or SAVEMOD before USEMOD to save code.
Simulations can start from 1973A to 1992A and must end by 2010A.
SIMULATE Command: simstart 1992a;
SIMULATE Command: dotil 2010a;
SIMULATE Command: filesim example2;
SIMULATE Command: do prtime( example2_yag, example2_ymi);

     EXAMPLE2_YAG   EXAMPLE2_YMI

1992A   22464.608356   1963.385902
1993A   23295.890734   1978.19102
1994A   21856.029144   1956.39711
1995A   21522.079839   1937.688582
1996A   21349.904688   1929.961903
1997A   21241.914571   1928.277048
1998A   21119.123578   1927.467355
1999A   20997.317339   1927.156804
2000A   20882.511042   1926.495081
2001A   20778.994226   1926.000848
2002A   20685.571285   1925.44431
2003A   20601.29129    1925.026546
2004A   20524.634302   1924.604854
2005A   20454.858297   1924.252741
2006A   20391.096492   1923.908206
2007A   20332.775655   1923.605296
2008A   20279.257987   1923.316132
2009A   20230.065413   1923.054226
2010A   20184.72685    1922.806333
```

In this example we give the same access and search as in the previous one. This means that all output that is stored will be written to the file d:\saudi\im\simres\simout.dat. The command «option screen off» is given from inside the files to avoid all the commands inside the access and search files to be displayed to the session window. Next we instruct TROLL to use the model IM95.

What is new in this example is that we want to use a macro called EXTRAP to extrapolate all the exogenous variables in the model by 20 years, starting in 1991. The macro is prepared in a text editor in advance and is compiled into an executable program in TROLL. As can be seen, when compiling, TROLL responds with the numbers of errors and warnings.

The call on the macro is done by the command &EXTRAP. The extrapolated exogenous variables are stored in the data base according to the search rules. In this example we have used the search file

SRCHSIMU, which has writeable search to the d:\saudi\im\simres\simout.dat data base, so the extrapolated variables will be stored here.

When we give the simulate command TROLL will, as explained in the previous example, analyze the model. The values for the variables will be taken from the data base according to the access and search rules. This means that TROLL will use the extrapolated variables to simulate the endogenous variables. Since we extrapolated the variables 20 years, the simulation must start in the period 1973 to 1992, and must end by 2010 (when we take the lags into consideration).

In the simstart and dotil commands we give the desired start and end year respectively. Immediately after entering the dotil command the model is simulated. In this example we have stored the simulated variables as EXAMPLE2, which means that the variables will have this name (EXAMPLE2) as a prefix to their originally names. This is illustrated when we print out the variables YAG and YMI which are saved as EXAMPLE2_YAG and EXAMPLE2_YMI respectively. The response from TROLL is to print out the forecasted series to screen.

Example 3: Forecasting 2

In this example we want to perform exactly the same as in the previous example by utilising the program REFSIM. We start by giving access and search. Note that we have given search to the data base for the historical time series (SRCHTIME), and not the directory for simulation output as earlier. We may do this because the correct access and search will be given from inside the program REFSIM. Next we compile the program REFSIM6, and TROLL respond with the numbers of errors and warnings. We execute the program with the command &REFSIM and the program first deletes all accesses and searches and replaces them with the correct ones. These commands, and TROLL's response to them, are not printed to screen because we have given the command «option screen off» inside the access and search files.

When we call the macro (or program) REFSIM we are asked for the name of the model and the name of the reference path. The reference path is the program file that extrapolates all exogenous variables (e.g. EXTRAP.SRC). Next we are asked for the start and end year of the simulation period.

Now the reference path is automatically compiled and executed, and the model is simulated for the given period. The simulation results are automatically stored in a formdata base with the same name as the reference path, but with extension DAT, and the variables are stored with prefix equal to the reference path. In this example the reference path is called EXTRAP so, for instance, the simulated values for the variable YAG is stored in the file d:\saudi\im\simres\extrap.dat, with the name EXTRAP_YAG.

Next two of the simulated variables are printed to screen. Note that we don't use semicolon after responding to the messages from a macro.

[6] If we are sure that the program is compiled earlier, and that it is not changed in any way, there is no need to compile it each time we want to make a call on it.

```
TROLL Release 0.94
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TROLL Command: input accessim
TROLL Command: option screen off;
TROLL Command: input srchtime
TROLL Command: option screen off;
TROLL Command: compile refsim

   TROLL Compiler: rel. 0.933

    END OF COMPILATION
  ERRORS:  0
  WARNINGS: 0
TROLL Command: &refsim
TROLL Command: option screen off;
Give the name of the model: im95
Give the name of the reference path: extrap
Give the start year xxxx (four digits only ): 1992
Give the end year xxxx: (four digits only ): 2010
EXTRAP  2010

   TROLL Compiler: rel. 0.933

    END OF COMPILATION
  ERRORS:  0
  WARNINGS: 0

Finished with extrapolating.

Analyzing Model's Incidence Matrix
Analyzing Model's Block Structure
Generating Simulation Code
Use FILEMOD or SAVEMOD before USEMOD to save code.
Simulations can start from 1973A to 1992A and must end by 2010A.

End of simulation.

TROLL Command: do prtime(extrap_yag, extrap_ymi);

      EXTRAP_YAG     EXTRAP_YMI

1992A   22464.608356    1963.385902
1993A   23295.890734    1978.19102
1994A   21856.029144    1956.39711
1995A   21522.079839    1937.688582
1996A   21349.904688    1929.961903
1997A   21241.914571    1928.277048
1998A   21119.123578    1927.467355
1999A   20997.317339    1927.156804
2000A   20882.511042    1926.495081
2001A   20778.994226    1926.000848
2002A   20685.571285    1925.44431
2003A   20601.29129     1925.026546
2004A   20524.634302    1924.604854
2005A   20454.858297    1924.252741
2006A   20391.096492    1923.908206
2007A   20332.775655    1923.605296
2008A   20279.257987    1923.316132
2009A   20230.065413    1923.054226
2010A   20184.72685     1922.806333
```

Example 4: To study effects of shifts in variables

In this example we perform a simulation where we have made a shift from the reference path in one of the variables. This can be done with the program ALTSIM. Before we start the calculation we must prepare the alternative scenario. The reference past must be an existing formdata file. In this example we use the reference path EXTRAP from the previous examples. As an alternative scenario we want to increase the variable CG (Government consumption) by 8 percent relative to the reference path, for the period 1992 to 1996. This change is done in the file ALT1REF17, in advance.

First we give access and search, this will eventually be corrected to the correct ones inside the ALTSIM program. Then we compile the program, this will check the program for errors. When executing the program, with the command &ALTSIM, we are prompted for the model name (IM95), the reference path (EXTRAP), the alternative scenario (ALT1REF1), the start year (1991) and the end year (2010).

When we have responded to these messages the program has all the information it needs. It starts with compiling the alternative scenario file (ALT1REF1.SRC) into an executable TROLL program before executing it. Then it simulates the model with the variable CG changed relative to the reference scenario. Both simulations are saved in one formdata file, with the same name as the alternative scenario, but with extension DAT, e.g. ALT1REF1.DAT. The variables in the reference path keep their name (prefix EXTRAP), and the variables from the alternative simulation will have the prefix ALT1REF1.

Note that the reference path is not simulated here, so it must already exist when running the program. It is copied into the new formdata base, so the reference path EXTRAP will exist also after the simulation.

All variables, as mentioned, are written to the file ALT1REF1.DAT. The variable YAG, for instance, have the names EXTRAP_YAG (from the reference path) and the name ALT1REF1_YAG (from the alternative scenario). Both variables, in addition to the shifted exogenous variable CG, are printed to screen.

[7] This file should be given a new name if another alterative scenario (policy) is to be made.

```
TROLL Release 0.94
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TROLL Command: input accessim
TROLL Command: option screen off;
TROLL Command: input srchtime
TROLL Command: option screen off;
TROLL Command: compile altsim

   TROLL Compiler: rel. 0.933

     END OF COMPILATION
  ERRORS:  0
  WARNINGS: 0
TROLL Command: &altsim
TROLL Command: option screen off;
Give the name of the model: im95
Give the name of the reference path: extrap
Give the name of the alternative scenario: alt1ref1
Give simulation startyear (only four digits xxxx): 1991
Give the endyear of simulation (only four digits xxxx): 2010

   TROLL Compiler: rel. 0.933

     END OF COMPILATION
  ERRORS:  0
  WARNINGS: 0
Finished changing exogenous variables.
Analyzing Model's Incidence Matrix
Analyzing Model's Block Structure
Generating Simulation Code
Use FILEMOD or SAVEMOD before USEMOD to save code.
Simulations can start from 1973A to 1992A and must end by 2010A.
End of simulation.
DO Command: do prtime(extrap_yag, alt1ref1_yag, extrap_cg, alt1ref1_cg);

     EXTRAP_YAG    ALT1REF1_YAG    EXTRAP_CG    ALT1REF1_CG

1991A   22943.351575   22943.351575  123377       123377
1992A   22593.544142   23234.123642  123377       133247.16
1993A   22216.571193   22790.251911  123377       133247.16
1994A   21911.151922   22444.851184  123377       133247.16
1995A   21720.419584   22235.992628  123377       133247.16
1996A   21515.382287   22038.356921  123377       133247.16
1997A   21359.838624   21316.148004  123377       123377
1998A   21199.850469   21216.250897  123377       123377
1999A   21068.492631   21126.198443  123377       123377
2000A   20941.930964   21019.190828  123377       123377
2001A   20833.611647   20906.084652  123377       123377
2002A   20732.170847   20789.256386  123377       123377
2003A   20642.872234   20689.899859  123377       123377
2004A   20560.302178   20597.756546  123377       123377
2005A   20486.363683   20517.967422  123377       123377
2006A   20418.320641   20444.185038  123377       123377
2007A   20356.684014   20378.367471  123377       123377
2008A   20299.978396   20317.655976  123377       123377
2009A   20248.18695    20262.748065  123377       123377
2010A   20200.451094   20212.156777  123377       123377
```

Annex B: List of variables

This list includes variables based on the National Accounts from spreadsheets provided by the Ministry of Planning, used either directly in the model or for calculation of model variables. Model residuals and some unutilised variables are also included. We differentiate between variables in constant prices, in current prices, price indices and other variables.

Variables in constant 1989-prices

GDP by economic activity

	Name in model/database
- Private, non-oil sector	YAP
- Agriculture, forestry and fishing	YAG
- Other mining, quarrying	YMI
- Petrochemicals	YAPS
- Other manufacturing	YAM
- Electricity, gas and water	YEW
- Construction	YEN
- Wholesale and retail trade	ETD
- Transport and communication	ITC
- Finance, insurance, real estate	YFR
- Real estate	YRE
- Finance, insurance	YFI
- Community services	YCS
- Imputed bank charges	YBC
- Government sector	YG
- Government services	YGS
- Oil sectors	YO
- Crude oil and natural gas	YOG
- Petroleum refining	YPR
- Import duties	YID
- GDP	Y

GFCF by sector and type of capital, capital stock and depreciation

- Private non-oil private investment	JP
- Private non-oil, residential building	JPH
- Private non-oil, non-residential building	JPB
- Private non-oil, transport and machinery equipment	JPTM
- Government investment	JG
- Government investment, non-residential building	JGB
- Government investment, transport and machinery equipment	JGTM
- Oil-sector investment	JO
- Oil-sector investment, non-residential building	JOB
- Oil-sector investment, transport and machinery equipment	JOTM
- GFCF, total	J
- Capital stock, private non-oil sector	KP
- Depreciation	DKP
- Depreciation rate	DKPRATE

Private consumption by object of expenditure

- Food, beverage, tobacco	CPFOO
- Clothing and footwear	CPCLO

- Rent, fuel and power	CPREN
- Furniture and household equipment	CPFUR
- Medical health care	CPMED
- Transport and communication	CPTRA
- Entertainment and education	CPENT
- Other goods and services	CPOTH
- Non-resident direct purchase	CPN
- Resident direct purchase abroad	CPABR
- Private final consumption	CP

Private resident consumption by object of expenditure

- Food, beverage, tobacco	CPRFOO
- Clothing and footwear	CPRCLO
- Rent, fuel and power	CPRREN
- Furniture and household equipment	CPRFUR
- Medical health care	CPRMED
- Transport and communication	CPRTRA
- Entertainment and education	CPRENT
- Other goods and services	CPROTH
- Resident direct purchase abroad	CPRABR
- Resident, total	CPR

GDP by type of expenditure n.e.s

- Imports of goods and services	M
- Import share	MS
- Exports of goods and services	X
- Exports of oil and gas	XOG
- Exports of refined products	XPR
- Exports of petrochemicals	XPS
- Exports of goods and services, less export of oil and gas, refined products, petrochemicals and non-resident direct purchase	XX
- Government final consumption	CG
- Increase in stocks	DS
- Domestic absorption	DA

Variables in current prices

Value of GDP by economic activity

- Private non-oil sector	VYP
- Agriculture, forestry and fishing	VYAG
- Other mining, quarrying	VYMI
- Petrochemicals	VYPS
- Other manufacturing	VYMA
- Electricity, gas and water	VYEW
- Construction	VYCN
- Wholesale and retail trade	VYTD
- Transport and communication	VYTC
- Finance, insurance, real estate	VYFR
- Real estate	VYRE
- Finance, insurance	VYFI
- Community services	VYCS
- Imputed bank charges	VYBC
- Government sector	VYG

- Government services	VYGS
- Oil sector	VYO
- Crude oil and natural gas	VYOG
- Petroleum refining	VYPR
- Import duties	VYID
- GDP	VY
Operating surplus by economic activity	
- Gross operating surplus, private non-oil sector	VYSP
- Agriculture, forestry and fishing	VYSAG
- Other mining, quarrying	VYSMI
- Petrochemicals	VYSPS
- Other manufacturing	VYSMA
- Electricity, gas and water	VYSEW
- Construction	VYSCN
- Wholesale and retail trade	VYSTD
- Transport and communication	VYSTC
- Finance, insurance, real estate	VYSFR
- Real estate	VYSRE
- Finance, insurance	VYSFI
- Community services	VYSCS
- Imputed bank charges	VYSBC
- Government sector	VYSG
- Government services	VYSGS
- Oil sectors	VYSO
- Crude oil and natural gas	VYSOG
- Petroleum refining	VYSPR
- Total operating surplus	VYS
- Gross operating surplus, household sector	VYSH
- Household share of VYSP	VYSSHARE
- Gross operating surplus, corporate sector	VYSC
Compensation of employees by economic activity	
- Private non-oil sector	VYWP
- Agriculture, forestry and fishing	VYWAG
- Other mining, quarrying	VYWMI
- Petrochemicals	VYWPS
- Other manufacturing	VYWMA
- Electricity, gas and water	VYWEW
- Construction	VYWCN
- Wholesale and retail trade	VYWTD
- Transport and communication	VYWTC
- Finance, insurance, real estate	VYWFR
- Real estate	VYWRE
- Finance, insurance	VYWFI
- Community services	VYWCS
- Imputed bank charges	VYWBC
- Government sector	VYWG
- Government services	VYWGS
- Oil sectors	VYWO
- Crude oil and natural gas	VYWOG
- Petroleum refining	VYWPR

- Total compensation of employees	VYW
Indirect taxes less subsidies by economic activity	
- Private non-oil sector	VYTP
- Agriculture, forestry and fishing	VYTAG
- Other mining, quarrying	VYTMI
- Petrochemicals	VYTPS
- Other manufacturing	VYTMA
- Electricity, gas and water	VYTEW
- Construction	VYTCN
- Wholesale and retail trade	VYTTD
- Transport and communication	VYTTC
- Finance, insurance, real estate	VYTFR
- Real estate	VYTRE
- Finance, insurance	VYTFI
- Community services	VYTCS
- Imputed bank charges	VYTBC
- Government sector	VYTG
- Government services	VYTGS
- Oil sectors	VYTO
- Crude oil and natural gas	VYTOG
- Petroleum refining	VYTPR
- Total net indirect taxes	VYT
GDP by type of expenditure n.e.s	
- Private consumption	VCP
- Private consumption, non-residential	VCPN
- Private consumption, residential	VCPR
- Government final consumption	VCG
- Total investment	VJ
- Investment, government sector	VJG
- Investment, oil sector	VJO
- Investment, private non-oil sector	VJP
- Imports of goods and services	VM
- Exports of goods and services	VX
- Exports of oil and gas	VXOG
- Exports of petrochemicals	VXPS
- Exports of refined products	VXPR
- Exports of goods and services, less export of oil and gas, refined products petrochemicals, and non-resident direct purchase	VXX
Price indices (1989=1)	
- Crude oil price, Arabian light	POIL
GDP by economic activity	
- Private non-oil sector	PYP
- Agriculture, forestry and fishing	PYAG
- Other mining, quarrying	PYMI
- Petrochemicals	PYPS
- Other manufacturing	PYMA
- Electricity, gas and water	PYEW
- Construction	PYCN

- Wholesale and retail trade	PYTD
- Transport and communication	PYTC
- Finance, insurance, real estate	PYFR
- Real estate	PYRE
- Finance, insurance	PYFI
- Community services	PYCS
- Imputed bank charges	PYBC
- Government sector	PYG
- Government services	PYGS
- Oil sectors	PYO
- Crude oil and natural gas	PYOG
- Petroleum refining	PYPR
- Import duties	PYID
- Total GDP	PY

GDP by type of expenditure

- Imports	PM
- Exports	PX
- Exports of oil and gas	PXOG
- Exports of petrochemicals	PXPS
- Exports of refined products	PXPR
- Exports of goods and services, less export of oil and gas, refined products petrochemicals and non-resident direct purchase	PXX
- Government final consumption	PCG
- Increase in stocks	PDS

GFCF by sector and type of capital

- Private non-oil investment	PJP
- Private non-oil, residential building	PJPH
- Private non-oil, non-residential building	PJPB
- Private non-oil, transport and machinery equipment	PJPTM
- Government investment	PJG
- Government investment, non-residential building	PJGB
- Government investment, transport and machinery equipment	PJGTM
- Oil-sector investment	PJO
- Oil-sector investment, non-residential building	PJOB
- Oil-sector investment, transport and machinery equipment	PJOTM
- GFCF, total	PJ

Private consumption by object of expenditure

- Food, beverage, tobacco	PCPFOO
- Clothing and footwear	PCPCLO
- Rent, fuel and power	PCPREN
- Furniture and household equipment	PCPFUR
- Medical health care	PCPMED
- Transport and communication	PCPTRA
- Entertainment and education	PCPENT
- Other goods and services	PCPOTH
- Non-resident direct purchase	PCPN
- Resident direct purchase abroad	PCPABR
- Private final consumption	PCP
- Resident , total	PCPR

Factor prices, excl. of net indirect taxes

- Agriculture, forestry and fishing	PYFAG
- Other mining, quarrying	PYFMI
- Petrochemicals	PYFPS
- Other manufacturing	PYFMA
- Electricity, gas and water	PYFEW
- Construction	PYFCN
- Wholesale and retail trade	PYFTD
- Transport and communication	PYFTC
- Real estate	PYFRE
- Finance, insurance	PYFFI
- Community services	PYFCS
- Government services	PYFGS
- Imputed bank charges	PYFBC
- Crude oil and natural gas	PYFOG
- Petroleum refining	PYFPR

Other variables

Employment, labour supply, wage rates and productivity

- Employment, Saudis	ES
- Employment, Saudis, private non-oil sector	ESP
- Employment, Saudis, government sector	ESG
- Employment, non-Saudis	EN
- Employment, non-Saudis private non-oil sector	ENP
- Employment, non-Saudis government sector	ENG
- Employment, private non-oil sector	EP
- Employment, government sector	EG
- Employment total	E
- Labour supply, total	LS
- Labour supply, men	LSW
- Labour supply, women	LSM
- Unemployment rate, Saudis	US
- Wage rate private non-oil sector	WP
- Wage rate government sector	WG
- Productivity, private non-oil sector	QP
- Productivity, government sector	QG

Household sector etc.

- Disposable income, households	HR
- Tax-rate, household income	THR
- Net financial wealth, households	HW
- Money supply, currency outside banks	M0
- Money supply, M0 + demand and time deposits	M2
- Banks claims on private sector	LIABP
- Dummy variable, equal to 1 in 1990, 0.5 in 1991, 0 elsewhere	D9091
- Private sector net financial investment	ZP

Net indirect taxes

- Agriculture, forestry and fishing	TAG
- Other mining, quarrying	TMI
- Petrochemicals	TPS
- Other manufacturing	TMA

- Electricity, gas and water	TEW
- Construction	TCN
- Wholesale and retail trade	TTD
- Transport and communication	TTC
- Real estate	TRE
- Finance, insurance	TFI
- Community services	TCS
- Government services	TGS
- Imputed bank charges	TBC
- Crude oil and natural gas	TOG
- Petroleum refining	TPR

Government sector

- Government budget surplus	ZG
- Government, total revenues	GRTOT
- Government, oil revenues	GROIL
- Governmnet, other revenues	GROTH
- Government, oil revenues as share of VYSO	GROSHARE
- Government, total expenditure	GETOT
- Government expenditure, chapter 1	GECH1
- Government expenditure, chapter 2	GECH2
- Government expenditure, chapter 3	GECH3
- Government expenditure, social security services	GESS
- Government expenditure, chapter 4	GECH4

- Investment credit, Saudi Agricultural Bank	ICSAB
- Investment credit, Saudi Credit Bank	ICSCB
- Investment credit, Ministry of Finance, Local Loans	ICMOF
- Investment credit, Public Investment Fund	ICPIF
- Investment credit, Industrial Development Fund	ICIDF
- Investment credit, Real Estate Fund	ICREF
- Investment credit, Non-residential buildings	ICH
- Investment credit, Residential buildings	ICB
- Investment credit, Transport and machienery	ICTM

Current account balance

- Current account balance	Z
- Net transfers and primary income	ZR

Residuals in I-O equations and econometric equations etc.

GDP by economic activity

- Agriculture, forestry and fishing	RYAG
- Other mining, quarrying	RYMI
- Petrochemicals	RYPS
- Other manufacturing	RYMA
- Electricity, gas and water	RYEW
- Construction	RYCN
- Wholesale and retail trade	RYTD
- Transport and communication	RYTC
- Finance, insurance, real estate	RYFR
- Real estate	RYRE

- Community services	RYCS
- Government services	RYGS
- Imputed bank charges	RYBC
- Crude oil and natural gas	RYOG
- Petroleum refining	RYPR
- Import duties	RYID
Prices, private and government consumption	
- Food, beverage, tobacco	RPCPFOO
- Clothing and footwear	RPCPCLO
- Rent, fuel and power	RPCPREN
- Furniture and household equipment	RPCPFUR
- Medical health care	RPCPMED
- Transport and communication	RPCPTRA
- Entertainment and education	RPCPENT
- Other goods and services	RPCPOTH
- Resident direct purchase abroad	RPCPABR
- Government final consumption	RPCG
Private consumption	
- Consumption by non-residents	RPCPN
- Value of private consumption by residents	RVCPR
- Private consumption by residents	RCPR
- Food, beverage, tobacco	RCPRFOO
- Clothing and footwear	RCPRCLO
- Rent, fuel and power	RCPRREN
- Furniture and household equipment	RCPRFUR
- Medical health care	RCPRMED
- Transport and communication	RCPRTRA
- Entertainment and education	RCPRENT
- Other goods and services	RCPROTH
Gross fixed capital formation	
- Government investment, non-residential building	RPJGB
- Government investment, transport and machinery equipment	RPJGTM
- Oil-sector investment, non-residential building	RPJOB
- Oil-sector investment, transport and machinery equipment	RPJOTM
- Non-oil private, residential building	RPJPH
- Non-oil private, non-residential building	RPJPB
- Non-oil private, transport and machinery equipment	RPJPTM
- Non-oil private, residential building	RJPH
- Non-oil private, non-residential building	RJPB
- Non-oil private, transport and machinery equipment	RJPTM
Current account	
- Exports of oil and gas	RPXOG
- Exports of petrochemicals	RPXPS
- Exports of refined products	RPXPR
- Exports of goods and services, less export of oil, gas, petrochemicals, refined products and non-resident direct purchase	RPXX

Wage and employment	
- Wage rate private sector	RWP
- Employment private sector	REP
Factor prices, excl. of net indirect taxes	
- Agriculture, forestry and fishing	RPYFAG
- Other mining, quarrying	RPYFMI
- Other manufacturing	RPYFMA
- Construction	RPYFCN
- Wholesale and retail trade	RPYFTD
- Transport and communication	RPYFTC
- Community services	RPYFCS
- Government services	RPYFGS
Government balance	
- Governmnet, other revenues	RGROTH
- Government expenditure, chapter 1	RGECH12
- Government expenditure, chapter 3	RGECH3
- Government expenditure, chapter 4	RGECH4
Not utilized variables:	
- Exports of merchandise, fob	VXMER
- Transport and communication	VXTRC
- Territorial bodies direct purchase	VXTDP
- Non-resident direct purchases	VXNDP
- Imports of merchandise, cif	VMMER
- Miscellaneous commodities	VMMIS
- Resident household direct purchase abroad	VMHDP
- Government direct purchase abroad	VMGDP
- Property income received	ZRPI
- Property income paid	ZEPI
- Compensation of employees paid	ZECO
- Other current transfers net	ZNCT

Annex C: The models block structure

This annex shows the models block structure. A block is the smallest number of equations necessary to solve for a variable. If a block concist of more than one equations, it means that some endogenous variables are solved simultaneously. The number of the block tells in which order they are solved. The size tells how many variables/equations that are solved in the block. The equation number tells which equation is used to solve for a specified variable, or more precise, it shows a «normalisation» that provides a one-to-one pairing of equations and endogenous variables.

The model has 71 blocks, including 1 simultaneous blocks.
The largest block has 107 equations and the next largest has 1

Block	Size	Eqn	Var
1	1	104	PYPS
2	1	105	PYEW
3	1	106	PYRE
4	1	107	PYFI
5	1	95	PYFGS
6	1	103	PYGS

7	1	108	PYBC
8	1	110	PYOG
9	1	109	PYPR
10	1	72	EP
11	107	1	CPR
		2	VCPR
		3	CPRFOO
		4	CPRCLO
		5	CPRREN
		6	CPRFUR
		7	CPRMED
		8	CPRTRA
		9	CPRENT
		10	CPROTH
		11	CPRABR
		12	CPFOO
		13	CPCLO
		14	CPREN
		15	CPFUR
		16	CPMED
		17	CPTRA
		18	CPENT
		19	CPOTH
		20	CPABR
		21	VCP
		22	CP
		23	PCP
		25	JPH
		26	JPB
		27	JPTM
		45	VCPN
		48	YAG
		49	YMI
		50	YPS
		51	YMA
		52	YEW
		53	YCN
		54	YTD
		55	YTC
		56	YRE
		57	YFI
		58	YCS
		59	YGS
		60	YBC
		61	XPR
		62	XOG
		64	YP
		65	VYP
		67	YG
		75	EG
		81	QP
		82	WP

83	VYWP
84	VYWG
85	VYW
86	HR
88	PYFAG
89	PYFMI
90	PYFMA
91	PYFCN
92	PYFTD
93	PYFTC
94	PYFCS
96	PYAG
97	PYMI
98	PYMA
99	PYCN
100	PYTD
101	PYTC
102	PYCS
112	PCPFOO
113	PCPCLO
114	PCPREN
115	PCPFUR
116	PCPMED
117	PCPTRA
118	PCPENT
119	PCPOTH
120	PCPABR
121	PCPR
122	PJPH
123	PJPB
124	PJPTM
135	PCPN
136	VYAG
137	VYMI
138	VYPS
139	VYMA
140	VYEW
141	VYCN
142	VYTD
143	VYTC
144	VYRE
145	VYFI
146	VYCS
147	VYBC
150	VYTAG
151	VYTMI
152	VYTPS
153	VYTMA
154	VYTEW
155	VYTCN
156	VYTTD
157	VYTTC

		158	VYTRE
		159	VYTFI
		160	VYTCS
		161	VYTBC
		164	VYTP
		166	VYSP
		167	VYSH
12	1	129	PCG
13	1	24	VCG
14	1	28	JP
15	1	29	JG
16	1	30	JO
17	1	31	J
18	1	32	VJP
19	1	125	PJGB
20	1	126	PJGTM
21	1	33	VJG
22	1	127	PJOB
23	1	128	PJOTM
24	1	34	VJO
25	1	35	VJ
26	1	37	DKP
27	1	36	KP
28	1	38	DA
29	1	39	X
30	1	131	PXOG
31	1	41	VXOG
32	1	132	PXPR
33	1	42	VXPR
34	1	133	PXPS
35	1	43	VXPS
36	1	134	PXX
37	1	44	VXX
38	1	40	VX
39	1	46	M
40	1	47	VM
41	1	63	YID
42	1	66	YO
43	1	68	Y
44	1	69	VYG
45	1	70	VYID
46	1	149	VYOG
47	1	148	VYPR
48	1	71	VY
49	1	73	ESP
50	1	74	ESG
51	1	76	E
52	1	77	ES
53	1	78	EN
54	1	79	LS
55	1	80	US

56	1	87	HW
57	1	111	PYP
58	1	130	PDS
59	1	162	VYTPR
60	1	163	VYTOG
61	1	165	VYT
62	1	168	VYSC
63	1	169	VYSO
64	1	170	Z
65	1	171	GECH12
66	1	172	GECH3
67	1	173	GECH4
68	1	174	GROTH
69	1	175	GROIL
70	1	176	ZG
71	1	177	ZP

Annex D: The models incidence matrix

This annex shows the models «incidence matrix», which identifies which current endogenous variable appear in which equation(s). The models incidence matrix is an useful tool when it comes to practical work with the model.

Variable Used in Equations (* cannot be solved for var)

CP	22 23 38
CPABR	20 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPCLO	13 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPENT	18 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPFOO	12 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPFUR	15 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPMED	16 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPOTH	19 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPR	1 11 22 121
CPRABR	2 11 20
CPRCLO	2 4 11 13
CPREN	14 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
CPRENT	2 9 11 18
CPRFOO	2 3 11 12
CPRFUR	2 6 11 15
CPRMED	2 7 11 16
CPROTH	2 10 11 19
CPRREN	2 5 11 14
CPRTRA	2 8 11 17
CPTRA	17 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
DA	38
DKP	36 37
E	76
EG	74 75 76 84
EN	78
EP	72 73 76 81 83 166
ES	77 80
ESG	74 77

ESP	73 77
GECH	12 171 176
GECH	3 172 176
GECH	4 173 176
GROIL	175 176
GROTH	174 176
HR	1 86 176
HW	87
J	31 38
JG	29 31
JO	30 31
JP	28 31 36
JPB	26 28 32 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
JPH	25 28 32 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
JPTM	27 28 32 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
KP	36
LS	79 80
M	46 47
PCG	24 129
PCP	23 82
PCPABR	2 3 4 5 6 7 8 9 10 120
PCPCLO	2 3 4 5 6 7 8 9 10 113 135
PCPENT	2 3 4 5 6 7 8 9 10 118
PCPFOO	2 3 4 5 6 7 8 9 10 112 135
PCPFUR	2 3 4 5 6 7 8 9 10 115 135
PCPMED	2 3 4 5 6 7 8 9 10 116
PCPN	45 135
PCPOTH	2 3 4 5 6 7 8 9 10 119 135
PCPR	1 121
PCPREN	2 3 4 5 6 7 8 9 10 114
PCPTRA	2 3 4 5 6 7 8 9 10 117 135
PDS	130
PJGB	33 125
PJGTM	33 126
PJOB	34 127
PJOTM	34 128
PJPB	26 32 123
PJPH	25 32 122
PJPTM	27 32 124
PXOG	41 131
PXPR	42 132
PXPS	43 133
PXX	44 134
PYAG	65 96 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 136
PYBC	65 108 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 147
PYCN	65 99 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 141
PYCS	65 102 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 146

PYEW	65 105 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 140
PYFAG	88 96 150
PYFCN	91 99 155
PYFCS	94 102 160
PYFGS	95 103
PYFI	65 107 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 145
PYFMA	90 98 153
PYFMI	89 97 151
PYFTC	93 101 157
PYFTD	92 100 156
PYGS	103 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134
PYMA	65 98 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 139
PYMI	65 97 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 137
PYOG	110 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133134 149
PYP	111
PYPR	109 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 148
PYPS	65 104 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 138
PYRE	65 106 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 144
PYTC	65 101 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 143
PYTD	65 100 112 113 114 115 116 117 118 119 120 122 123 124 125 126 127 128 129 131 132 133 134 142
QP	81 82
US	80
VCG	24 130
VCP	21 23 130
VCPN	21 40 45
VCPR	2 3 4 5 6 7 8 9 10 21 121
VJ	35 130
VJG	33 35 173
VJO	34 35
VJP	32 35
VM	47 130 170
VX	40 130 170
VXOG	40 41
VXPR	40 42
VXPS	40 43
VXX	40 44
VY	71 130
VYAG	136 150
VYBC	147 161
VYCN	141 155
VYCS	146 160

VYEW 140 154
VYFI 145 159
VYG 69 71
VYID 70 71 174
VYMA 139 153
VYMI 137 151
VYOG 71 149 163 169
VYP 65 71 111 166
VYPR 71 148 162 169
VYPS 138 152
VYRE 144 158
VYSC 168
VYSH 86 167
VYSO 169 175
VYSP 166 167 168
VYT 165 172
VYTAG 150 164
VYTBC 161 164
VYTC 143 157
VYTCN 155 164
VYTCS 160 164
VYTD 142 156
VYTEW 154 164
VYTFI 159 164
VYTMA 153 164
VYTMI 151 164
VYTOG 163 165 169
VYTP 164 165 166
VYTPR 162 165 169
VYTPS 152 164
VYTRE 158 164
VYTTC 157 164
VYTTD 156 164
VYW 85 86
VYWG 84 85 171
VYWP 83 85
WP 82 83 88 89 90 91 92 93 94 166
X 39
XOG 39 41 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
XPR 39 42 46 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
Y 68
YAG 48 64 65 136 150
YBC 60 64 65 147 161
YCN 53 64 65 141 155
YCS 58 64 65 146 160
YEW 52 64 65 140 154
YFI 57 64 65 145 159
YG 67 68 69 75
YGS 59 67
YID 63 68 70
YMA 51 64 65 139 153
YMI 49 64 65 137 151

YO 66 68
YP 64 68 81 111
YPS 50 64 65 138 152
YRE 56 64 65 144 158
YTC 55 64 65 143 157
YTD 54 64 65 142 156
Z 170 177
ZG 176 177
ZP 177

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