Statistics Norway
Research Department

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Documents

The Selection Model

Technical Documentation of Computer Programs and Procedures

Documents 96/10 • Statistics Norway, June 1996

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Abstract:
This document describes the computer programs and procedures developed to operate the Selection Model, a Computable General Equilibrium (CGE) 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. 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 macro-economic 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. The model is intended for use in the elaboration of the Development Plans for the Saudi economy. Although the planning process is currently centred around five-year plans, each plan needs to be considered in a somewhat more long term perspective. Thus a model that focuses on more long term effects, specially with respect to utilization of resources, is warranted. The model is closely linked to the Implementation Model, in that the data and aggregation level is the same. 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 the simulations.

Keywords: Saudi Arabia, CGE-model, macroeconomic planning

JEL-classification: O53, O21, E17

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Contents

1. Introduction[1]

This document describes the model system and presents the computer programs made to operate the Selection 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 model specific computer programs, and thereby as a reference work for those operating the model.

Although the Saudi Arabian economy is centred around the five-year development plans, each plan needs to be considered in a somewhat more long term perspective. The Selection Model is designed to be a model tool in the preparation of the development plans, in particular to analyse consequences of investment programs, whether undertaken by the government or the private sector. Accordingly the available resources are taken as given in the model. The modelling of different sectors makes the model able to analyse the composition of investment programs.

The model and 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 program made specially for the Selection Model. Among them are the routines for controlling the input to and the output from the model system, as well as programs used when making forecasts.

The document is organized as follows: Chapter 2 gives a description of the directories and the file structure used to operate 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, simulation and/or estimation results, 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. In chapter 5 we present the equations in the main model and in the two sub-models. Chapter 6 gives a presentation of the input/output coefficients. Finally, in chapter 7, the programs made to simplify the extrapolation and simulation tasks 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.

[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 Selection Model are modified versions of programs originally developed by him, Nils Ø. Mæhle and Rune Johansen, also Statistics Norway, see Bowitz et al. (1995).

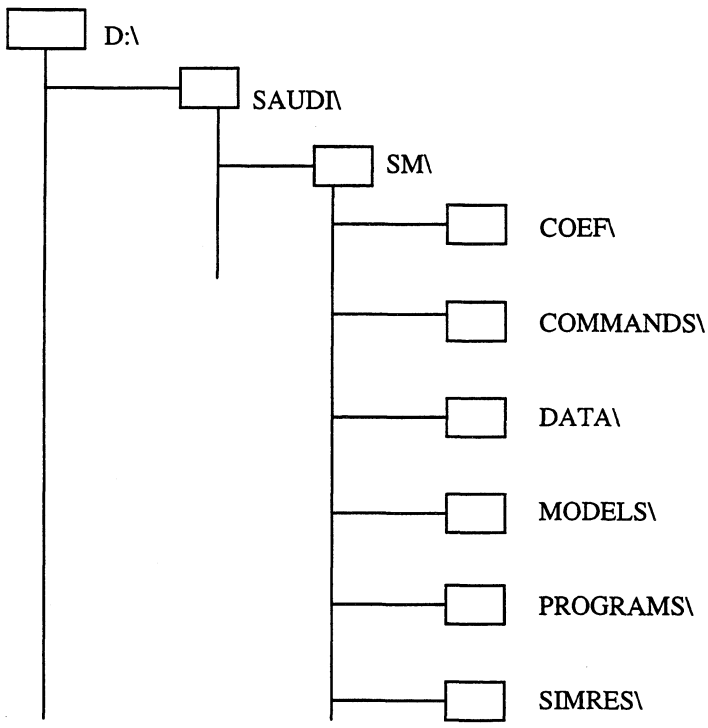
2. Directories and file structure

This chapter gives an overview of the files and directories created to operate the Selection Model in a suitable way. TROLL is very flexible when it comes to decide where to get input and where to direct output. The organization of the system in connection with the model, the 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 system are explained.

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 which constitute the TROLL software. 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 Selection Model



The organization of directories is shown in Figure 1. It shows that the directories are held apart from the TROLL directory (not shown here). The TROLL directory contains original TROLL commands, macros and program files and we want to avoid to mix them with our specially designed programs. This requires some kind of link between the directories made for the Selection Model and the TROLL software. This link is established 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\SM. The access and search files are located at the D:\TROLL directory[2].

[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.

Figure 1 shows the different directories created to organize the different data objects in connection with the model system. SAUDI is a main directory where the Selection Model, together with the other model system developed (not shown here), are located. The SM 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 the estimated coefficients are stored inside the only file located at this directory. The coefficients are mainly estimated inside TROLL. The COMMANDS directory consist, among others, of the input files used to generate the historical time series and the models. These files contains commands which, when executed by TROLL, establishes the data base and 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 model. It must be noticed that this directory consist of 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 installed at the DATA directory. Another search file is used when estimating the coefficients to ensure that the resulting coefficients 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 it must be noticed that there are three directories which all 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 originated from 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 Selection 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 ample information inside the source 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 inside 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 revised and corrected using a text editor.

Table 2.3.

Files	*Description*
SM.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.

[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.

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 (extension SRC) and then compiled in TROLL and given the extension PRG that shows that this is an executable program file.

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 organizing the simulations, REFSIM and ALTSIM, are examples 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.

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

Files	*Description*
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*
SM.MOD	the main model in TROLL code, generated from the input file SM.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 the 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, can consist of many formdata files.

Table 2.7.

Files	*Description*
SIMOUT.DAT	here simulation output are stored when the model is 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 aim 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's 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 has default access and search. 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 Selection Model.

3.2.1.1. Accesssm.inp

```
option screen off;

/* input file ACCESSSM.INP.

/* Input file for the Selection Model. Opens databases or disk directories and adds them
/* to the list of accessed databases.
```

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

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

delaccess all;

/* Open the database for the original timeseries data.
access smtim type formdata id d:\saudi\sm\data\times.dat mode w;

/* Open the database for the estimated regression coefficients.
access smcoe type formdata id d:\saudi\sm\coef\regrcoef.dat mode w;

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

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

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

/* Open the database for the simulation output.
access smsim type formdata id d:\saudi\sm\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 data base for the historical time series. 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. Srchtism.inp

```
option screen off;

/* Input file SRCHTISM.INP

/* Input file for the Selection 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 database is to
/* be updated. Note that there is given a readable search to the datatypes DATA for both the
/* 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 smtim w;

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

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

```
/* Writeable search for the models.
search model smmod w;

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

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

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

/* The next commands install some coefficients into the RAM memory
input io-coef;
input les-coef;
input delta
input wage;
input rho;

quit;
```

3.2.2.2. Srchcosm.inp

```
option screen off;

/* Input file SRCHCOSM.INP

/* Input file for the Selection Models. Adds entries to the search list, which  specifies where
/* TROLL should look for files. This input file should be used when the coefficient database is to
/* be updated. Note that there is given a readable search to the datatypes DATA for both the
/* historical time series 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 smtim ;

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

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

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

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

/* Writeable search for the program files.
search program smprog w;
```

```
/* Writeable search for the source files.
search source smprog w;

/* The next commands install some coefficients into the RAM memory
input io-coef;
input les-coef;
input delta
input wage;
input rho;

quit;
```

3.2.2.3. Srchsism.inp

```
option screen off;

/* Input file SRCHSISM.INP

/* Input file for the Selection Models. Adds entries to the search list, which  specifies where
/* TROLL should look for files. This input file should be used when the simulation database is to
/* be used. Note that there is given a readable search to the datatypes DATA for both the
/* historical time series 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 smtim ;

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

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

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

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

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

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

/* The next commands install some coefficients into the RAM memory
input io-coef;
input les-coef;
input delta
input wage;
```

```
input rho;

quit;
```

4. Historical data

The Selection Models historical data base, TIMES.DAT is located at the \SAUDI\SM\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\SM\COMMANDS directory.

/* MAINDAT.INP is the input file for the time series database. The file uses the DEDIT macro which
/* starts an interactive editing session:

/* TRANSDAT.INP is an input file that transforms some of the time series, as linear combinations of
/* already excisting time series. This file primarily defines new variables using excisting ones generated
/* by MAINDAT.INP.

/* 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 the values (the differences) 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 database 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 all the accesses and searches eventually given earlier, and replace them with the correct
/* ones.


delaccess all;
delsearch all;

input accesssm;
input srchtism;
```

```
input maindat
input transdat
input resaddit
input resmulti

quit;
```

4.1.1. Maindat.inp

```
option screen off;

/* Input file MAINDAT.INP.

/* This input file is used to generate the time series database. 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.

delaccess all;
delsearch all;

input accesssm;
input srchtism;

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

&DEDIT KAG 1988A; DATA 40105 40000; FILE;
&DEDIT KMI 1988A; DATA 4947 5000; FILE;
&DEDIT KPS 1988A; DATA 18210 20000; FILE;
&DEDIT KMA 1988A; DATA 32842 35000; FILE;
&DEDIT KEW 1988A; DATA 27789 30000; FILE;
&DEDIT KCN 1988A; DATA 29684 30000; FILE;
&DEDIT KTD 1988A; DATA 49368 50000; FILE;
&DEDIT KTC 1988A; DATA 38221 40000; FILE;
&DEDIT KRE 1988A; DATA 198825 200000; FILE;
&DEDIT KFI 1988A; DATA 60947 60000; FILE;
&DEDIT KCS 1988A; DATA 20000 20000; FILE;
&DEDIT KOG 1988A; DATA 148280 142200; FILE; /*Corrected by kam
&DEDIT KPR 1988A; DATA 31368 30000; FILE; /* Corrected by kam

&DEDIT RKAG 1988A; DATA 0 0; FILE;
&DEDIT RKMI 1988A; DATA 0 0; FILE;
&DEDIT RKPS 1988A; DATA 0 0 ; FILE;
&DEDIT RKMA 1988A; DATA 0 0 ; FILE;
&DEDIT RKEW 1988A; DATA 0 0 ; FILE;
&DEDIT RKCN 1988A; DATA 0 0 ; FILE;
&DEDIT RKTD 1988A; DATA 0 0 ; FILE;
&DEDIT RKTC 1988A; DATA 0 0 ; FILE;
&DEDIT RKRE 1988A; DATA 0 0 ; FILE;
&DEDIT RKFI 1988A; DATA 0 0 ; FILE;
&DEDIT RKCS 1988A; DATA 0 0 ; FILE;
&DEDIT RKOG 1988A; DATA 0 0 ; FILE;
&DEDIT RKPR 1988A; DATA 0 0 ; FILE;

&DEDIT KAPAG 1989A; DATA 40000; FILE;
&DEDIT KAPMI 1989A; DATA 5000; FILE;
&DEDIT KAPPS 1989A; DATA 20000; FILE;
&DEDIT KAPMA 1989A; DATA 35000; FILE;
&DEDIT KAPEW 1989A; DATA 30000; FILE;
&DEDIT KAPCN 1989A; DATA 30000; FILE;
&DEDIT KAPTD 1989A; DATA 50000; FILE;
&DEDIT KAPTC 1989A; DATA 40000; FILE;
&DEDIT KAPRE 1989A; DATA 200000; FILE;
&DEDIT KAPFI 1989A; DATA 60000; FILE;
&DEDIT KAPCS 1989A; DATA 20000; FILE;
&DEDIT KAPOG 1989A; DATA 142200; FILE;
&DEDIT KAPPR 1989A; DATA 30000; FILE;

&DEDIT EAG 1989A; DATA 393.2; FILE;
&DEDIT EMI 1989A; DATA 3.7; FILE;
&DEDIT EPS 1989A; DATA 6.5; FILE;
&DEDIT EMA 1989A; DATA 473.0; FILE;
&DEDIT EEW 1989A; DATA 66.5; FILE;
&DEDIT ECN 1989A; DATA 916.7; FILE;
&DEDIT ETD 1989A; DATA 921.9; FILE;
```

```
&DEDIT ETC 1989A; DATA 274.9; FILE;
&DEDIT ERE 1989A; DATA 50; FILE;
&DEDIT EFI 1989A; DATA 274.6; FILE;
&DEDIT ECS 1989A; DATA 1919.4; FILE;
&DEDIT EOG 1989A; DATA 49.6; FILE;
&DEDIT EPR 1989A; DATA 15.2; FILE;

&DEDIT REAG 1989A; DATA 0; FILE;
&DEDIT REMI 1989A; DATA 0; FILE;
&DEDIT REPS 1989A; DATA 0; FILE;
&DEDIT REMA 1989A; DATA 0; FILE;
&DEDIT REEW 1989A; DATA 0; FILE;
&DEDIT RECN 1989A; DATA 0; FILE;
&DEDIT RETD 1989A; DATA 0; FILE;
&DEDIT RETC 1989A; DATA 0; FILE;
&DEDIT RERE 1989A; DATA 0; FILE;
&DEDIT REFI 1989A; DATA 0; FILE;
&DEDIT RECS 1989A; DATA 0; FILE;
&DEDIT REOG 1989A; DATA 0; FILE;
&DEDIT REPR 1989A; DATA 0; FILE;

&DEDIT JAG 1989A; DATA 1900; FILE;
&DEDIT JMI 1989A; DATA 300; FILE;
&DEDIT JPS 1989A; DATA 2700; FILE;
&DEDIT JMA 1989A; DATA 3800; FILE;
&DEDIT JEW 1989A; DATA 3600; FILE;
&DEDIT JCN 1989A; DATA 1800; FILE;
&DEDIT JTD 1989A; DATA 3100; FILE;
&DEDIT JTC 1989A; DATA 3690; FILE;
&DEDIT JRE 1989A; DATA 8400; FILE;
&DEDIT JFI 1989A; DATA 2100; FILE;
&DEDIT JCS 1989A; DATA 1000; FILE;
&DEDIT JOG 1989A; DATA 1334; FILE;
&DEDIT JPR 1989A; DATA 200; FILE;

&DEDIT JOGB 1989A; DATA 1085; FILE;
&DEDIT JPRB 1989A; DATA 163; FILE;
&DEDIT JOGTM 1989A; DATA 249; FILE;
&DEDIT JPRTM 1989A; DATA 37 ; FILE;

&DEDIT PROP 1989A; DATA 1; FILE;

&DEDIT RJAG 1989A; DATA 0; FILE;
&DEDIT RJMI 1989A; DATA 0; FILE;
&DEDIT RJPS 1989A; DATA 0; FILE;
&DEDIT RJMA 1989A; DATA 0; FILE;
&DEDIT RJEW 1989A; DATA 0; FILE;
&DEDIT RJCN 1989A; DATA 0; FILE;
&DEDIT RJTD 1989A; DATA 0; FILE;
&DEDIT RJTC 1989A; DATA 0; FILE;
&DEDIT RJRE 1989A; DATA -34; FILE;
&DEDIT RJFI 1989A; DATA 0; FILE;
&DEDIT RJCS 1989A; DATA 0; FILE;
&DEDIT RJOG 1989A; DATA 0; FILE;
&DEDIT RJPR 1989A; DATA 0; FILE;

&DEDIT IR 1989A; DATA 0.15; FILE;
```

```
&DEDIT  POPSA 1989A; DATA  14430; FILE;

&DEDIT  LRRATE 1989A; DATA  0.137318; FILE;

&DEDIT  LR 1989A; DATA  1981.498; FILE;

do;delsave all;

/*input io-coef;
/*input les-coef;
/*input delta;
/*input rho;
/*input wage;

quit;
```

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 database 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 accesssm;
input srchtism;

/* This file is used to generate new variables that is suitable to 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 and 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);

/* Definition of the marginal elasticities with respect to employment.

DOFILE A.AG = 0.4;
DOFILE A.MI = 0.8;
DOFILE A.PS = 0.5;
DOFILE A.MA = 0.5;
DOFILE A.EW = 0.45;
DOFILE A.CN = 0.5;
DOFILE A.TD = 0.2;
DOFILE A.TC = 0.7;
DOFILE A.RE = 0.15;
DOFILE A.FI = 0.15;
DOFILE A.CS = 0.5;
DOFILE A.OG = 0.1;
DOFILE A.PR = 0.4;


/* Residuals.
```

```
/* Production in "Agriculture, forestry and fishing".
DOFILE RYAG =
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".
DOFILE RYMI =
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".
DOFILE RYPS =
YPS -
(
A.PS.CPFOO * (1 - MS * A.M.CPFOO)/(1 - A.M.CPFOO) * CPFOO +
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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".
DOFILE RYMA =
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".
DOFILE RYEW =
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 +
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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".
DOFILE RYCN =
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 +
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".
DOFILE RYTD =
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 +
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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".
DOFILE RYTC =
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 +
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".
DOFILE RYRE =
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 +
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```
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".
DOFILE RYFI =
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 +
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".
DOFILE RYCS =
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".
DOFILE RYGS =
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
);

/* Production in "Imputed bank charges".
DOFILE RYBC =
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 +
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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".
DOFILE RYOG =
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".
DOFILE RYPR =
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 +
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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".
DOFILE RYID =
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)))  +
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/* 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)));

DOFILE RCPRFOO =
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))
);

DOFILE RCPRCLO =
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))
);

DOFILE RCPREN =
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))
);

DOFILE RCPRFUR =
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))
);

DOFILE RCPRMED =
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))
);

DOFILE RCPRTRA =
CPRTRA -
(
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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))
);

DOFILE RCPRENT =
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))
);

DOFILE RCPROTH =
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))
);

DOFILE RCPRREN =
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))
);


DOFILE RCPR =
(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
);

DOFILE RJPH =
(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))
);

DOFILE RJPB =
(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))
);

DOFILE RJPTM =
(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))
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);

DOFILE RWP =
(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
);

DOFILE REP =
(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))
);

DOFILE RVCPR =
VCPR -
(
PCPFOO * CPRFOO + PCPCLO * CPRCLO + PCPREN * CPRREN + PCPFUR * CPRFUR +
PCPMED * CPRMED + PCPTRA * CPRTRA + PCPENT * CPRENT + PCPREN * CPROTH +
PCPABR * CPRABR
);

DOFILE RPCPN =
PCPN - (0.07 * PCPFOO + 0.06  * PCPCLO + 0.22 *  PCPFUR + 0.01  *  PCPTRA + 0.64  *  PCPOTH);

DOFILE RGECH12 =
GECH12 - VYWG;

DOFILE RGECH3 =
GECH3 - (GESS  - VYT);

DOFILE RGECH4 =
GECH4 -  VJG;

DOFILE RGROTH =
GROTH -  VYID;

DOFILE TFPAG = YAG / (EAG**A.AG*KAG**(1-A.AG));
DOFILE TFPMI = YMI / (EMI**A.MI*KMI**(1-A.MI));
DOFILE TFPPS = YPS / (EPS**A.PS*KPS**(1-A.PS));
DOFILE TFPMA = YMA / (EMA**A.MA*KMA**(1-A.MA));
DOFILE TFPCN = YCN / (ECN**A.CN*KCN**(1-A.CN));
DOFILE TFPCS = YCS / (ECS**A.CS*KCS**(1-A.CS));
DOFILE TFPEW = YEW / (EEW**A.EW*KEW**(1-A.EW));
DOFILE TFPFI = YFI / (EFI**A.FI*KFI**(1-A.FI));
DOFILE TFPRE = YRE / (ERE**A.RE*KRE**(1-A.RE));
DOFILE TFPTC = YTC / (ETC**A.TC*KTC**(1-A.TC));
DOFILE TFPTD = YTD / (ETD**A.TD*KTD**(1-A.TD));
DOFILE TFPOG = YOG / (EOG**A.OG*KOG**(1-A.OG));
DOFILE TFPPR = YPR / (EPR**A.PR*KPR**(1-A.PR));

DOFILE WAG = VYWAG / EAG;
DOFILE WMI = VYWMI / EMI;
DOFILE WPS = VYWPS / EPS;
DOFILE WMA = VYWMA / EMA;
DOFILE WCN = VYWCN / ECN;
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DOFILE WCS = VYWCS / ECS;
DOFILE WEW = VYWEW / EEW;
DOFILE WFI = VYWFI / EFI;
DOFILE WRE = VYWRE / ERE;
DOFILE WTC = VYWTC / ETC;
DOFILE WTD = VYWTD / ETD;
DOFILE WOG = VYWOG / EOG;
DOFILE WPR = VYWPR / EPR;

DOFILE W = VYW / E;


DOFILE IRAG = VYSAG/KAG - 0.05;
DOFILE IRMI = VYSMI/KMI - 0.05;
DOFILE IRPS = VYSPS/KPS - 0.05;
DOFILE IRMA = VYSMA/KMA - 0.05;
DOFILE IRCN = VYSCN/KCN - 0.05;
DOFILE IRCS = VYSCS/KCS - 0.05;
DOFILE IREW = VYSEW/KEW - 0.05;
DOFILE IRFI = VYSFI/KFI - 0.05;
DOFILE IRRE = VYSRE/KRE - 0.03634;
DOFILE IRTC = VYSTC/KTC - 0.05;
DOFILE IRTD = VYSTD/KTD - 0.05;
DOFILE IROG = VYSOG/KOG - 0.05;
DOFILE IRPR = VYSPR/KPR - 0.05;

DOFILE PKAG = IRAG + 0.05;
DOFILE PKMI = IRMI + 0.05;
DOFILE PKPS = IRPS + 0.05;
DOFILE PKMA = IRMA + 0.05;
DOFILE PKCN = IRCN + 0.05;
DOFILE PKCS = IRCS + 0.05;
DOFILE PKEW = IREW + 0.05;
DOFILE PKFI = IRFI + 0.05;
DOFILE PKRE = IRRE + 0.03634;
DOFILE PKTC = IRTC + 0.05;
DOFILE PKTD = IRTD + 0.05;
DOFILE PKOG = IROG + 0.05;
DOFILE PKPR = IRPR + 0.05;


DOFILE REAG = EAG - (A.AG * PYFAG / WAG * YAG);
DOFILE REMI = EMI - (A.MI * PYFMI / WMI * YMI);
DOFILE REPS = EPS - (A.PS * PYFPS / WPS * YPS);
DOFILE REMA = EMA - (A.MA * PYFMA / WMA * YMA);
DOFILE REEW = EEW - (A.EW * PYFEW / WEW * YEW);
DOFILE RECN = ECN - (A.CN * PYFCN / WCN * YCN);
DOFILE RETD = ETD - (A.TD * PYFTD / WTD * YTD);
DOFILE RETC = ETC - (A.TC * PYFTC / WTC * YTC);
DOFILE RERE = ERE - (A.RE * PYFRE / WRE * YRE );
DOFILE REFI = EFI - (A.FI * PYFFI / WFI * YFI);
DOFILE RECS = ECS - (A.CS * PYFCS / WCS * YCS);
DOFILE REOG = EOG - ( A.OG * PYFOG / WOG * YOG);
DOFILE REPR = EPR - (A.PR * PYFPR / WPR * YPR );

DOFILE RKAG = KAG - ((1-A.AG) * PYFAG / PKAG * YAG);
DOFILE RKMI = KMI - ((1-A.MI) * PYFMI / PKMI * YMI );
DOFILE RKPS = KPS - ((1-A.PS) * PYFPS / PKPS * YPS );
```

```
DOFILE RKMA = KMA - ((1-A.MA) * PYFMA / PKMA * YMA );
DOFILE RKCN = KCN - ((1-A.CN) * PYFCN / PKCN * YCN);
DOFILE RKTD = KTD - ((1-A.TD) * PYFTD / PKTD * YTD );
DOFILE RKTC = KTC - ((1-A.TC) * PYFTC / PKTC * YTC );
DOFILE RKRE = KRE -  ((1-A.RE) * PYFRE / PKRE * YRE );
DOFILE RKFI = KFI - ((1-A.FI) * PYFFI / PKFI * YFI );
DOFILE RKCS = KCS - ((1-A.CS) * PYFCS / PKCS * YCS);
DOFILE RKOG = KOG - ((1-A.OG) * PYFOG / PKOG * YOG);
DOFILE RKPR = KPR - ((1-A.PR) * PYFPR / PKPR * YPR );


DOFILE RPYFGS = PYFGS/WG;

quit;
```

4.1.3. Calculation of residuals. Additive and multiplicative residuals

In the Selection 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 database.
/* It's aim is to calculate the additive residuals from the equations  in the main model and store them in the
/* historical database. 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 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 accesssm;
input srchtism;

/* 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);

quit;
```

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 database 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 database 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 accesssm;
input srchtism;

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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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; 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;

/* This model is now the current working model. We want to change to the main model.
usemod sm;

quit;
```

5. The models

5.1. Introduction

The Selection 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. Sm.inp

```
option screen off;

/* Input file SM.INP.

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

delaccess all;
delsearch all;

input accesssm;
input srchtism;


usemod sm;
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,


/*  Domestic absorption.

/* Equation 25
DA = CPR + CG + J + DS,


/*  Exports.

/* Equation 26
X = XOG + XPR + XPS + XX + CPN ,

/* Equation 27
VX = VXOG + VXPR + VXPS + VXX + VCPN ,

/* Equation 28
VXOG = PXOG * XOG,

/* Equation 29
VXPR = PXPR * XPR,
```

```
/* Equation 30
VXPS = PXPS * XPS,

/* Equation 31
VXX = PXX * XX ,

/* Equation 32
VCPN = PCPN * CPN ,


/*  Imports.

/* Equation 33
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 34
VM = PM * M,


/*  Production by sector.

/* Agriculture, forestry and fishing.
/* Equation 35
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 36
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 37
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 38
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 +
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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 39
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 40
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 +
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 +
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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 41
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 42
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 +
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 +
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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 43
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 44
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 +
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 45
YCS =
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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 46
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 + RYGS,

/* Imputed bank charges.
/* Equation 47
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 +
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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 48
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 49
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 +
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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 50
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 51
YP = YAG + YMI + YPS + YMA + YEW + YCN + YTD + YTC + YRE + YFI + YCS + YBC,

/* Equation 52
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 53
YO = YOG + YPR ,

/* Equation 54
YG = YGS ,

/* Equation 55
Y = YP + YO + YG + YID,

/* Equation 56
VYG = PYG * YG ,

/* Equation 57
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VYID = PYID * YID,

/* Equation 58
VY = VYP + VYOG + VYPR + VYG + VYID,

/*  Wage costs.

/* Equation 59
VYWP = WP * EP,

/* Equation 60
VYWG = WG * EG,

/* Equation 61
VYW = VYWP + VYWG + VYWO,


/*  Household disposable income and wealth.

/* Equation 62
HR = VYW + VYSH + GESS,

/* Equation 63
HW = M2 - M0 - LIABP,


/*  Sector factorprices.

/*  Sector prices including net indirect taxes.

/* Equation 64
PYAG = ((1 - TAG.0) / (1 - TAG)) * PYFAG,

/* Equation 65
PYMI = ((1 - TMI.0) / (1 - TMI)) * PYFMI,

/* Equation 66
PYMA = ((1 - TMA.0) / (1 - TMA)) * PYFMA,

/* Equation 67
PYCN = ((1 - TCN.0) / (1 - TCN)) * PYFCN,

/* Equation 68
PYTD = ((1 - TTD.0) / (1 - TTD)) * PYFTD,

/* Equation 69
PYTC = ((1 - TTC.0) / (1 - TTC)) * PYFTC,

/* Equation 70
PYCS = ((1 - TCS.0) / (1 - TCS)) * PYFCS,

/* Equation 71
PYGS = ((1 - TGS.0) / (1 - TGS)) * PYFGS,

/* Equation 72
PYPS = ((1 - TPS.0) / (1 - TPS)) * PYFPS,

/* Equation 73
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PYEW = ((1 - TEW.0) / (1 - TEW)) * PYFEW,

/* Equation 74
PYRE = ((1 - TRE.0) / (1 - TRE)) * PYFRE,

/* Equation 75
PYFI = ((1 - TFI.0) / (1 - TFI)) * PYFFI,

/* Equation 76
PYBC = ((1 - TBC.0) / (1 - TBC)) * PYFBC,

/* Equation 77
PYPR = ((1 - TPR.0) / (1 - TPR)) * PYFPR,

/* Equation 78
PYOG = ((1 - TOG.0) / (1 - TOG)) * PYFOG,


/* Equation 79
PYP = VYP / YP,

/* Equation 80
PYFGS= WG *RPYFGS,


/*  Final demand prices.

/* Food,beverages and tobacco.
/* Equation 81
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 82
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 +
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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 83
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 ,

/* Furniture and household equipment.
/* Equation 84
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 85
PCPMED =
(MS * A.M.CPMED * PM +
A.AG.CPMED * (1 - MS * A.M.CPMED) / (1 - A.M.CPMED) * PYAG +
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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 86
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 ,

/* Entertainment and education.
/* Equation 87
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 ,
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/* Other goods and services.
/* Equation 88
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 89
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,

/* Total resident.
/* Equation 90
PCPR = VCPR / CPR ,

/* Private non-oil, residential building.
/* Equation 91
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 +
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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 92
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 ,

/* Private non-oil, transport and machinery equipment.
/* Equation 93
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 94
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 +
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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 95
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 ,

/* Oil-sector investment, non-residential building.
/* Equation 96
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 97
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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 ,


/* Equation 98
PJP = VJP / JP,

/* Government final consumption.
/* Equation 99
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,

/* Increase in stocks.
/* Equation 100
PDS = (VY + VM - VCP - VCG - VJ - VX ) / DS,

/* Exports of oil and gas.
/* Equation 101
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 +
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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 102
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 103
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 104
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 105
PCPN = 0.07 * PCPFOO + 0.06 * PCPCLO + 0.22 * PCPFUR + 0.01 * PCPTRA + 0.64 * PCPOTH + RPCPN,


/* Value of sectoral production.

/* Equation 106
VYAG = PYAG * YAG,

/* Equation 107
VYMI = PYMI * YMI,

/* Equation 108
VYPS = PYPS * YPS,

/* Equation 109
VYMA = PYMA * YMA,

/* Equation 110
VYEW = PYEW * YEW,

/* Equation 111
VYCN = PYCN * YCN,

/* Equation 112
VYTD = PYTD * YTD,

/* Equation 113
VYTC = PYTC * YTC,

/* Equation 114
VYRE = PYRE * YRE,

/* Equation 115
VYFI = PYFI * YFI,

/* Equation 116
VYCS = PYCS * YCS,
```

```
/* Equation 117
VYBC = PYBC * YBC,

/* Equation 118
VYPR = PYPR * YPR,

/* Equation 119
VYOG = PYOG * YOG,


/*  Net indirect taxes.

/* Equation 120
VYTAG = VYAG - PYFAG * (1 - TAG.0) * YAG ,

/* Equation 121
VYTMI = VYMI - PYFMI * (1 - TMI.0) * YMI ,

/* Equation 122
VYTPS = VYPS - PYFPS * (1 - TPS.0) * YPS ,

/* Equation 123
VYTMA = VYMA - PYFMA * (1 - TMA.0) * YMA ,

/* Equation 124
VYTEW = VYEW - PYFEW * (1 - TEW.0) * YEW ,

/* Equation 125
VYTCN = VYCN - PYFCN * (1 - TCN.0) * YCN ,

/* Equation 126
VYTTD = VYTD - PYFTD * (1 - TTD.0) * YTD ,

/* Equation 127
VYTTC = VYTC - PYFTC * (1 - TTC.0) * YTC ,

/* Equation 128
VYTRE = VYRE - PYFRE * (1 - TRE.0) * YRE ,

/* Equation 129
VYTFI = VYFI - PYFFI * (1 - TFI.0) * YFI ,

/* Equation 130
VYTCS = VYCS - PYFCS * (1 - TCS.0) * YCS ,

/* Equation 131
VYTBC = VYBC - PYFBC * (1 - TBC.0) * YBC ,

/* Equation 132
VYTPR = VYPR - PYFPR * (1 - TPR.0) * YPR ,

/* Equation 133
VYTOG = VYOG - PYFOG * (1 - TOG.0) * YOG ,

/* Equation 134
VYTP =
VYTAG + VYTMI + VYTPS + VYTMA + VYTEW + VYTCN + VYTTD + VYTTC + VYTRE + VYTFI +
VYTCS + VYTBC ,
```

```
/* Equation 135
VYT = VYTP + VYTOG + VYTPR ,


/*  Gross operating surplus.

/*  Private, total.

/* Equation 136
VYSP = VYP - VYTP - WP * EP,


/*  Household share.

/* Equation 137
VYSH = VYSSHARE * VYSP,

/* Company share.

/* Equation 138
VYSC = (1 - VYSSHARE) * VYSP,

/* Equation 139
VYSO = VYOG + VYPR - VYTOG - VYTPR - VYWO,


/* Current account balance.

/* Equation 140
Z = VX - VM + ZR,


/* Government budget.

/* Equation 141
GECH12 = VYWG + RGECH12,

/* Equation 142
GECH3 = GESS - VYT + RGECH3,

/* Equation 143
GECH4 = VJG + RGECH4,

/* Equation 144
GROTH = VYID + RGROTH,

/* Equation 145
GROIL = GROSHARE * VYSO,

/* Equation 146
ZG = GROIL + GROTH + THR * HR - GECH12 - GECH3 - GECH4,


/*  Private sector net financial investment

/* Equation 147
ZP = Z - ZG,
```

```
/* Equation 148
YAG = TFPAG * EAG ** A.AG*KAG ** (1-A.AG),

/* Equation 149
YMI = TFPMI * EMI ** A.MI*KMI ** (1-A.MI),

/* Equation 150
YPS = TFPPS * EPS ** A.PS*KPS ** (1-A.PS),

/* Equation 151
YMA = TFPMA * EMA ** A.MA*KMA ** (1-A.MA),

/* Equation 152
YEW = TFPEW * EEW ** A.EW*KEW ** (1-A.EW),

/* Equation 153
YCN = TFPCN * ECN ** A.CN*KCN ** (1-A.CN),

/* Equation 154
YTD = TFPTD * ETD ** A.TD*KTD ** (1-A.TD),

/* Equation 155
YTC = TFPTC * ETC ** A.TC*KTC ** (1-A.TC),

/* Equation 156
YRE = TFPRE * ERE ** A.RE*KRE ** (1-A.RE),

/* Equation 157
YFI = TFPFI * EFI ** A.FI*KFI ** (1-A.FI),

/* Equation 158
YCS = TFPCS * ECS ** A.CS*KCS ** (1-A.CS),

/* Equation 159
YOG = TFPOG * EOG ** A.OG*KOG ** (1-A.OG),

/* Equation 160
YPR = TFPPR * EPR ** A.PR*KPR ** (1-A.PR),

/* Equation 161
EAG = A.AG * PYFAG / WAG * YAG + REAG,

/* Equation 162
EMI = A.MI * PYFMI / WMI * YMI + REMI,

/* Equation 163
EPS = A.PS * PYFPS / WPS * YPS + REPS,

/* Equation 164
EMA = A.MA * PYFMA / WMA * YMA + REMA,

/* Equation 165
EEW = A.EW * PYFEW / WEW * YEW + REEW,

/* Equation 166
ECN = A.CN * PYFCN / WCN * YCN + RECN,
```

```
/* Equation 167
ETD = A.TD * PYFTD / WTD * YTD + RETD,

/* Equation 168
ETC = A.TC * PYFTC / WTC * YTC + RETC,

/* Equation 169
ERE = A.RE * PYFRE / WRE * YRE + RERE,

/* Equation 170
EFI = A.FI * PYFFI / WFI * YFI + REFI,

/* Equation 171
ECS = A.CS * PYFCS / WCS * YCS + RECS,

/* Equation 172
EOG = A.OG * PYFOG / WOG * YOG + REOG,

/* Equation 173
EPR = A.PR * PYFPR / WPR * YPR + REPR,

/* Equation 174
EP=EAG+EMI+EPS+EMA+EEW+ECN+ETD+ETC+ERE+EFI+ECS,

/* Equation 175
EG = YG / QG ,

/* Equation 176
E = EP + EG + EOG + EPR ,

/* Equation 177
LR = LRRATE*POPSA,

/* Equation 178
EN + LR = E,

/*  Productivity

/* Equation 179
QP = YP / EP,

/* Equation 180
KAG = (1-A.AG) * PYFAG / PKAG * YAG + RKAG,

/* Equation 181
KMI = (1-A.MI) * PYFMI / PKMI * YMI + RKMI,

/* Equation 182
KPS = (1-A.PS) * PYFPS / PKPS * YPS + RKPS,

/* Equation 183
KMA = (1-A.MA) * PYFMA / PKMA * YMA + RKMA,

/* Equation 184
KCN = (1-A.CN) * PYFCN / PKCN * YCN + RKCN,

/* Equation 185
KTD = (1-A.TD) * PYFTD / PKTD * YTD + RKTD,
```

```
/* Equation 186
KTC = (1-A.TC) * PYFTC / PKTC * YTC + RKTC,

/* Equation 187
KRE = (1-A.RE) * PYFRE / PKRE * YRE + RKRE,

/* Equation 188
KFI = (1-A.FI) * PYFFI / PKFI * YFI + RKFI,

/* Equation 189
KCS = (1-A.CS) * PYFCS / PKCS * YCS + RKCS,

/* Equation 190
KOG = (1-A.OG) * PYFOG / PKOG * YOG + RKOG,

/* Equation 191
KPR = (1-A.PR) * PYFPR / PKPR * YPR + RKPR,

/* Equation 192
KP=KAG+KMI+KPS+KMA+KEW+KCN+KTD+KTC+KRE+KFI+KCS,

/* Equation 193
JAG = KAG - (1-DELTA.AG)*KAG(-1)+RJAG,

/* Equation 194
JMI = KMI - (1-DELTA.MI)*KMI(-1)+RJMI,

/* Equation 195
JPS = KPS - (1-DELTA.PS)*KPS(-1)+RJPS,

/* Equation 196
JMA = KMA - (1-DELTA.MA)*KMA(-1)+RJMA,

/* Equation 197
JEW = KEW - (1-DELTA.EW)*KEW(-1)+RJEW,

/* Equation 198
JCN = KCN - (1-DELTA.CN)*KCN(-1)+RJCN,

/* Equation 199
JTD = KTD - (1-DELTA.TD)*KTD(-1)+RJTD,

/* Equation 200
JTC = KTC - (1-DELTA.TC)*KTC(-1)+RJTC,

/* Equation 201
JRE = KRE - (1-DELTA.RE)*KRE(-1)+RJRE,

/* Equation 202
JFI = KFI - (1-DELTA.FI)*KFI(-1)+RJFI,

/* Equation 203
JCS = KCS - (1-DELTA.CS)*KCS(-1)+RJCS,

/* Equation 204
JOG = KOG - (1-DELTA.OG)*KOG(-1)+RJOG,
```

```
/* Equation 205
JPR = KPR - (1-DELTA.PR)*KPR(-1)+RJPR,

/* Equation 206
JOB=JOGB+JPRB,

/* Equation 207
JOTM=JOGTM+JPRTM,

/* Equation 208
JOG=JOGB+JOGTM,

/* Equation 209
JPR=JPRB+JPRTM,

/* Equation 210
 JPH=JRE,


/* Equation 211
JPB=0.53*(JAG+JMI+JPS+JMA+JEW+JCN+JTD+JTC+JFI+JCS),

/* Equation 212
JPTM=0.47*(JAG+JMI+JPS+JMA+JEW+JCN+JTD+JTC+JFI+JCS),

/* Equation 213
JP = JPH + JPB + JPTM ,

/* Equation 214
JG = JGB + JGTM,

/* Equation 215
JO = JOB + JOTM,

/* Equation 216
J = JP + JG + JO,

/* Equation 217
VJP = PJPH * JPH + PJPB * JPB + PJPTM * JPTM,

/* Equation 218
VJG = PJGB * JGB + PJGTM * JGTM,

/* Equation 219
VJO = PJOB * JOB + PJOTM * JOTM,

/* Equation 220
VJ = VJP + VJG + VJO,

/* Equation 221
PKAG = PJP*(IRAG + DELTA.AG),

/* Equation 222
PKMI = PJP*(IRMI + DELTA.MI),

/* Equation 223
PKPS = PJP*(IRPS + DELTA.PS),
```

```
/* Equation 224
PKMA = PJP*(IRMA + DELTA.MA),

/* Equation 225
PKCN = PJP*(IRCN + DELTA.CN),

/* Equation 226
PKTD = PJP*(IRTD + DELTA.TD),

/* Equation 227
PKTC = PJP*(IRTC + DELTA.TC),

/* Equation 228
PKRE = PJP*(IRRE + DELTA.RE),

/* Equation 229
PKFI = PJP*(IRFI + DELTA.FI),

/* Equation 230
PKCS = PJP*(IRCS + DELTA.CS),

/* Equation 231
PKOG = PJP*(IROG + DELTA.OG),

/* Equation 232
PKPR = PJP*(IRPR + DELTA.PR),

/* Equation 233
IRAG = RHO.AG * IR,

/* Equation 234
IRMI = RHO.MI * IR,

/* Equation 235
IRMA = RHO.MA * IR,

/* Equation 236
IRCN = RHO.CN * IR,

/* Equation 237
IRTD = RHO.TD * IR,

/* Equation 238
IRTC = RHO.TC * IR,

/* Equation 239
IRRE = RHO.RE * IR,

/* Equation 240
IRFI = RHO.FI * IR,

/* Equation 241
IRCS = RHO.CS * IR,


/* Equation 242
WAG=W.AG * WP,
```

```
/* Equation 243
WMI=W.MI * WP,

/* Equation 244
WPS=W.PS * WP,

/* Equation 245
WMA=W.MA * WP,

/* Equation 246
WEW=W.EW * WP,

/* Equation 247
WCN=W.CN * WP,

/* Equation 248
WTD=W.TD * WP,

/* Equation 249
WTC=W.TC * WP,

/* Equation 250
WRE=W.RE * WP,

/* Equation 251
WFI=W.FI * WP,

/* Equation 252
WCS=W.CS * WP,

/* Equation 253
WOG=W.OG * WP,

/* Equation 254
WPR=W.PR * WP;


CHANGESYM ENDOGENOUS
KP GECH12 GECH3 GECH4 GROIL GROTH YAG 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  EP EG E LR 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 PCP PJP PYFAG PYFMI PYFGS PYFCS PYFCN PYFTD PYFTC PYFMA PYFEW PYFFI  PYFRE
TFPOG  YPR  XPS EAG EMI EPS EMA EEW ECN ETD ETC ERE EFI ECS EOG EPR KAG KMI KPS
KMA KCN KTD KTC KFI KCS KOG KPR KEW KRE JAG JMI  JMA  JCN JTD JTC  JFI JCS JOG JPR JOB
JOTM JRE PKAG PKMI PKPS PKMA PKCN PKTD PKTC PKRE PKFI PKCS PKOG PKPR WAG WMI
WPS WMA WEW WCN WTD WTC WRE WFI WCS WOG WPR IRAG IRMI IRMA IRCN IRTD IRTC IRFI
IRCS IRPS IROG IRPR  IRRE
```

;

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
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.XXA.AG A.MI A.PS A.MA A.EW A.CN A.TD A.TC A.RE A.FI A.CS A.OG A.PR DELTA.AG
DELTA.MI DELTA.PS DELTA.MA DELTA.EW DELTA.CN
DELTA.TD DELTA.TC DELTA.RE DELTA.FI DELTA.CS DELTA.OG
DELTA.PR W.AG W.MI W.PS W.MA W.EW W.CN W.TD W.TC W.RE W.FI W.CS W.OG

```
W.PR  RHO.AG RHO.MI RHO.MA  RHO.CN RHO.TD RHO.TC RHO.FI RHO.CS ;

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 accesssm;
input srchtism;

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+
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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+
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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=
(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+
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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+
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+
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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+
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+
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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+
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+
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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+
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+
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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
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 database 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 database (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 database 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 saves to the disk directory for models.

/* From this point on the file only plays a "passive" role in the generation of the time series database, 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 +
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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 +
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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 +
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 =
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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 +
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 +
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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 +
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,

/* 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 +
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;
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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;
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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;
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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;
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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;
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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;
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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;


quit;
```

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 only temporarily installed 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;
```

6.4. Wage.inp

```
option screen off;

/* Input file WAGE.INP, for the Selection Model.

/* This file contains the coefficients that relates the sectoral wages rate to the wage rate in the private
/* sector. The coefficients are generated in the following way: Employment by sector is available for
/* 1989 according to table 2.5 in the Sixth Development Plan. Using this information we can estimate
/* the wage rate in each sector in the base year (1989) as Wii = VYWii/Eii, where VYWii is compensation
/* of employees in sector ii, and Eii is number of employees in sector ii.

/* Our objective is, as mentioned, to estimate the coefficients that relates the sectoral wages rate to the wage
/* rate in the private sector. This is done as W.ii = Wii/WP, where Wii is defined above, and WP is wage rate
/* in the private sector.

/* This method gave the following results.

DO W.AG = 1.688;
```

```
DO W.MI = 31.352;
DO W.MA = 0.923;
DO W.PS = 22.735;
DO W.TC = 5.148;
DO W.TD = 0.439;
DO W.FI = 0.824;
DO W.RE = 1.616;
DO W.EW = 1.198;
DO W.CS = 0.234;
DO W.CN = 1.396;
DO W.OG = 10.992;
DO W.PR = 18.439;

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

6.5. Delta.inp

```
option screen off;

/* Input file DELTA.INP, for the Selection Model.

/* This file installs the capital stock depreciation rate by sector into the RAM memory by the DO
/* command. The depreciation rate are assumed equal to one, except for production of real estate.
/* The latter was residually determined to be 0.03634, which is reasonable since buildings depreciates
/* slower than other types of capital.


DO DELTA.AG = 0.05;
DO DELTA.MI = 0.05;
DO DELTA.PS = 0.05;
DO DELTA.MA = 0.05;
DO DELTA.EW = 0.05;
DO DELTA.CN = 0.05;
DO DELTA.TD = 0.05;
DO DELTA.OG = 0.05;
DO DELTA.PR = 0.05;
DO DELTA.RE=0.03634;
DO DELTA.FI= 0.05;
DO DELTA.CS =  0.05;
DO DELTA.TC =  0.05;

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

6.6. Rho.inp

```
option screen off;

/* Input file RHO.INP for the Selection Model.

/* This file contains the «guesstimated» coefficients that relates the sectoral capital real rate of return
/* to the real rate of return in the private sector. The coefficients are installed into the RAM memory.

DO RHO.AG = 2.169;
DO RHO.MI = 0.199;
DO RHO.MA = 0.905;
DO RHO.PS = 0.4;
DO RHO.TC = 0.886;
```

```
DO RHO.TD = 2.662;
DO RHO.FI = 1.247;
DO RHO.RE = -0.073;
/* DO RHO.EW = -0.009;
DO RHO.CS = 1.645;
DO RHO.CN = 3.419;
DO RHO.OG = 3.286;
DO RHO.PR = 0.998;

/* To go to the 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 period we wish to simulate. 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 model 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"\nGive the per cent change from one periode 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"\nGive 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 database 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 database 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 1990  0 end
&FORECAST; >>CPN 20 1990 0 end
&FORECAST; >>D9091 20 1990 0 end
&FORECAST; >>XX 20 1990 0 end
&FORECAST; >>YOG 20 1990 0 end
&FORECAST; >>PYFOG 20 1990 0 end
&FORECAST; >>PYFPR 20 1990  0 end
&FORECAST; >>PYFPS 20 1990 0 end
&FORECAST; >>JGB 20 1990  0 end
&FORECAST; >>JGTM 20 1990 0 end
&FORECAST; >>JOGB 20 1990 0 end
&FORECAST; >>JOGTM 20 1990 0 end
&FORECAST; >>JPRB 20 1990 0 end
&FORECAST; >>JPRTM 20 1990 0 end
```

```
&FORECAST; >>QG 20 1990 0 end
&FORECAST; >>PM 20 1990  0 end
&FORECAST; >>WG 20 1990  0 end
&FORECAST; >>GESS 20 1990  0 end
&FORECAST; >>MS 20 1990  0 end
&FORECAST; >>POIL 20 1990 0 end
&FORECAST; >>LIABP 20 1990  0 end
&FORECAST; >>M0 20 1990 0  end
&FORECAST; >>M2 20 1990 0 end
&FORECAST; >>DS 20 1990 0   end
&FORECAST; >>ICH 20 1990 0 end
&FORECAST; >>POPSA 20 1990 0 end
&FORECAST; >>WP 20 1990  0 end
&FORECAST; >>LRRATE 20 1990 0 end
&FORECAST; >>EN 20 1990 0 end
&FORECAST; >>ENG 20 1990 0 end
&FORECAST; >>ENP 20 1990 0 end
&FORECAST; >>GROSHARE 20 1990 0 end
&FORECAST; >>IR 20 1990 0 end
&FORECAST; >>IRRE 20 1990 0 end
&FORECAST; >>JPS 20 1990 0 end
&FORECAST; >>JEW 20 1990 0 end
&FORECAST; >>LSM 20 1990 0 end
&FORECAST; >>LSW 20 1990 0 end
&FORECAST; >> PYFBC 20 1990 0 end
&FORECAST; >> PYG 20 1990 0 end
&FORECAST; >> PYID 20 1990 0 end
&FORECAST; >> TAG 20 1990 0 end
&FORECAST; >> TBC 20 1990 0 end
&FORECAST; >> TCN 20 1990 0 end
&FORECAST; >> TCS 20 1990 0 end
&FORECAST; >> TEW 20 1990 0 end
&FORECAST; >> TFI 20 1990 0 end
&FORECAST; >> TFPAG 20 1990 0 end
&FORECAST; >> TFPCN 20 1990 0 end
&FORECAST; >> TFPCS 20 1990 0 end
&FORECAST; >> TFPEW 20 1990 0 end
&FORECAST; >> TFPFI 20 1990 0 end
&FORECAST; >> TFPMA 20 1990 0 end
&FORECAST; >> TFPMI 20 1990 0 end
&FORECAST; >> TFPPR 20 1990 0 end
&FORECAST; >> TFPPS 20 1990 0 end
&FORECAST; >> TFPRE 20 1990 0 end
&FORECAST; >> TFPTC 20 1990 0 end
&FORECAST; >> TFPTD 20 1990 0 end
&FORECAST; >> TGS 20 1990 0 end
&FORECAST; >> THR 20 1990 0 end
&FORECAST; >> TMA 20 1990 0 end
&FORECAST; >> TMI 20 1990 0 end
&FORECAST; >> TOG 20 1990 0 end
&FORECAST; >> TPR 20 1990 0 end
&FORECAST; >> TPS 20 1990 0 end
&FORECAST; >> TRE 20 1990 0 end
&FORECAST; >> TTC 20 1990 0 end
&FORECAST; >> TTD 20 1990 0 end
&FORECAST; >> VYSSHARE 20 1990 0 end
&FORECAST; >> VYWO 20 1990 0 end
&FORECAST; >> ZR 20 1990 0 end
```

```
/* &FOREECON; >> RCPR 1990 0 20 end
&FOREECON; >> RJPH 1990 0 20 end

&FORECAST; >> RPYFGS 20 1990 0 end
&FORECAST; >> RCPRCLO 20 1990 0 end
&FORECAST; >> RCPRENT 20 1990 0 end
&FORECAST; >> RCPRFOO 20 1990 0 end
&FORECAST; >> RCPRFUR 20 1990 0 end
&FORECAST; >> RCPRMED 20 1990 0 end
&FORECAST; >> RCPROTH 20 1990 0 end
&FORECAST; >> RCPRREN 20 1990 0 end
&FORECAST; >> RCPRTRA 20 1990 0 end
&FORECAST; >> REAG 20 1990 0 end
&FORECAST; >> RECN 20 1990 0 end
&FORECAST; >> RECS 20 1990 0 end
&FORECAST; >> REEW 20 1990 0 end
&FORECAST; >> REFI 20 1990 0 end
&FORECAST; >> REMA 20 1990 0 end
&FORECAST; >> REMI 20 1990 0 end
&FORECAST; >> REOG 20 1990 0 end
&FORECAST; >> REPR 20 1990 0 end
&FORECAST; >> REPS 20 1990 0 end
&FORECAST; >> RERE 20 1990 0 end
&FORECAST; >> RETC 20 1990 0 end
&FORECAST; >> RETD 20 1990 0 end
&FORECAST; >> RGECH12 20 1990 0 end
&FORECAST; >> RGECH3 20 1990 0 end
&FORECAST; >> RGECH4 20 1990 0 end
&FORECAST; >> RGROTH 20 1990 0 end
&FORECAST; >> RJAG 20 1990 0 end
&FORECAST; >> RJCN 20 1990 0 end
&FORECAST; >> RJCS 20 1990 0 end
&FORECAST; >> RJEW 20 1990 0 end
&FORECAST; >> RJFI 20 1990 0 end
&FORECAST; >> RJMA 20 1990 0 end
&FORECAST; >> RJMI 20 1990 0 end
&FORECAST; >> RJOG 20 1990 0 end
&FORECAST; >> RJPR 20 1990 0 end
&FORECAST; >> RJPS 20 1990 0 end
&FORECAST; >> RJRE 20 1990 0 end
&FORECAST; >> RJTC 20 1990 0 end
&FORECAST; >> RJTD 20 1990 0 end
&FORECAST; >> RKAG 20 1990 0 end
&FORECAST; >> RKCN 20 1990 0 end
&FORECAST; >> RKCS 20 1990 0 end
&FORECAST; >> RKFI 20 1990 0 end
&FORECAST; >> RKMA 20 1990 0 end
&FORECAST; >> RKMI 20 1990 0 end
&FORECAST; >> RKOG 20 1990 0 end
&FORECAST; >> RKPR 20 1990 0 end
&FORECAST; >> RKPS 20 1990 0 end
&FORECAST; >> RKRE 20 1990 0 end
&FORECAST; >> RKTC 20 1990 0 end
&FORECAST; >> RKTD 20 1990 0 end
&FORECAST; >> RPCG 20 1990 0 end
&FORECAST; >> RPCPABR 20 1990 0 end
&FORECAST; >> RPCPCLO 20 1990 0 end
```

```
&FORECAST; >> RPCPENT 20 1990 0 end
&FORECAST; >> RPCPFOO 20 1990 0 end
&FORECAST; >> RPCPFUR 20 1990 0 end
&FORECAST; >> RPCPMED 20 1990 0 end
&FORECAST; >> RPCPN 20 1990 0 end
&FORECAST; >> RPCPOTH 20 1990 0 end
&FORECAST; >> RPCPREN 20 1990 0 end
&FORECAST; >> RPCPTRA 20 1990 0 end
&FORECAST; >> RPJGB 20 1990 0 end
&FORECAST; >> RPJGTM 20 1990 0 end
&FORECAST; >> RPJOB 20 1990 0 end
&FORECAST; >> RPJOTM 20 1990 0 end
&FORECAST; >> RPJPB 20 1990 0 end
&FORECAST; >> RPJPH 20 1990 0 end
&FORECAST; >> RPJPTM 20 1990 0 end
&FORECAST; >> RPXOG 20 1990 0 end
&FORECAST; >> RPXPR 20 1990 0 end
&FORECAST; >> RPXPS 20 1990 0 end
&FORECAST; >> RPXX 20 1990 0 end
&FORECAST; >> RVCPR 20 1990 0 end
&FORECAST; >> RYAG 20 1990 0 end
&FORECAST; >> RYBC 20 1990 0 end
&FORECAST; >> RYCN 20 1990 0 end
&FORECAST; >> RYCS 20 1990 0 end
&FORECAST; >> RYEW 20 1990 0 end
&FORECAST; >> RYFI 20 1990 0 end
&FORECAST; >> RYGS 20 1990 0 end
&FORECAST; >> RYID 20 1990 0 end
&FORECAST; >> RYMA 20 1990 0 end
&FORECAST; >> RYMI 20 1990 0 end
&FORECAST; >> RYOG 20 1990 0 end
&FORECAST; >> RYPR 20 1990 0 end
&FORECAST; >> RYPS 20 1990 0 end
&FORECAST; >> RYRE 20 1990 0 end
&FORECAST; >> RYTC 20 1990 0 end
&FORECAST; >> RYTD 20 1990 0 end

print("");
PRINT("Finished with extrapolating the variables.");
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 database 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 periode 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.

/* 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 database 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-periode, 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-periode (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 organise the reference simulations. The program requires that the program used
/* to extrapolate the exogenous variableshave 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 accesssm;
        >>input srchsism

/* 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 database 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 database is REF.

        >>access ref type formdata id c:\saudi\sm\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 database, to be used when extrapolating the exogenous variables.
        >>search first data smtim;

        >>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 C:\\SAUDI\\SM\\SIMRES\\",refname, ".DAT.\nwith the
prefix ",refname);
print("");

end;
```

7.2.2. Altsim.src

```
/* Source file ALTSIM.SRC.

/* Main program that organises the simulations scenarios. Scenarios is deviations from the reference path due
/* to changes in one or some of the exogenous variables. The changes in the exogenous variables, relative to
/* the reference path, is made in a source file which is called upon from this program (ALT1REF1.SRC is
/* such a source file, but each scenario should be stored with different names).

/* This program prompt the user for the model, the reference path, start year and endyear of simulation, and
/* the source file with the changes in the exogenous variables. The reference path must be simulated in advance
/* and stored on the same directory. The result of this program will contain simulated values from both the
/* reference path and the alternative scenario.

addfun main;
procedure main()
begin;

        >>delsearch all;
        >>delaccess all;
        >>input accesssm;
        >>input srchtism;

        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 c:\\saudi\\sm\\simres\\&(refname).dat c:\\saudi\\sm\\simres\\&(sn).dat";

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

/* The reference simlation is stored here (the reference path).
        >> access ref type formdata id c:\saudi\sm\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 C:\\SAUDI\\SM\\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 c:\saudi\sm\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 C:\\SAUDI\\SM\\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 buildt 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 must
/* not give this prefix, only "original" variable name.

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

addfun main ;
procedure main()
begin;
        on warning nomsg;
        get rs "Give the name of reference simulation: " ;

        >> access rssea TYPE formdata id c:\saudi\sm\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 periode 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 database.

/* When a simulation is performed and the results are saved in the database, we are given temporarily
/* access and search to this. But as soon as we stop TROLL or type delaccess all and delsearch 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 database"Give the name of the database to open (no extension): ";
        get nickname"Give a nickname for the database to open: ";

        >>access &(nickname) type formdata id c:\saudi\sm\simres\&(database).dat mode w;
        >>search data &(nickname) w;

end;
```

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Annex A. 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. We differentiate between variables in constant prices, in current prices, price indices, and other variables and residuals.

Variables in constant 1989-prices

GDP by economic activity

	Name in model/databank
- Private, non-oil sector	YP
- Agriculture, forestry and fishing	YAG
- Other mining, quarrying	YMI
- Petrochemicals	YPS
- Other manufacturing	YMA
- Electricity, gas and water	YEW
- Construction	YCN
- Wholesale and retail trade	YTD
- Transport and communication	YTC
- 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

- Private, non-oil sector	JP
- Agriculture, forestry and fishing	JAG
- Other mining, quarrying	JMI
- Petrochemicals	JPS
- Other manufacturing	JMA
- Electricity, gas and water	JEW
- Construction	JCN
- Wholesale and retail trade	JTD
- Transport and communication	JTC
- Real estate	JRE
- Finance, insurance	JFI
- Community services	JCS
- Private non-oil, residential building	JPH
- Private non-oil, non-residential building	JPB
- Private non-oil, transport and machinery equipment	JPTM
- Government sector	JG
- Government investment, non-residential building	JGB
- Government investment, transport and machinery equipment	JGTM

- Oil sectors	JO
- Oil sectors, non-residential building	JOB
- Oil sectors, transport and machinery equipment	JOTM
- Crude oil and natural gas	JOG
- Crude oil and natural gas, non-residential building	JOGB
- Crude oil and natural gas, transport and machinery equipment	JOGTM
- Petroleum refining	JPR
- Petroleum refining, non-residential building	JPRB
- Petroleum refining, transport and machinery equipment	JPRM
- GFCF, total	J

Capital stock by sector

- Private, non-oil sector	KP
- Agriculture, forestry and fishing	KAG
- Other mining, quarrying	KMI
- Petrochemicals	KPS
- Other manufacturing	KMA
- Electricity, gas and water	KEW
- Construction	KCN
- Wholesale and retail trade	KTD
- Transport and communication	KTC
- Real estate	KRE
- Finance, insurance	KFI
- Community services	KCS
- Crude oil and natural gas	KOG
- Petroleum refining	KPR

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

- 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	
- 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

Employment, wages etc.

Employment and labour supply	
- Private, non-oil sector	EP
- Agriculture, forestry and fishing	EAG
- Other mining, quarrying	EMI
- Petrochemicals	EPS
- Other manufacturing	EMA
- Electricity, gas and water	EEW
- Construction	ECN
- Wholesale and retail trade	ETD
- Transport and communication	ETC
- Real estate	ERE
- Finance, insurance	EFI
- Community services	ECS
- Government sector	EG
- Crude oil and natural gas	EOG
- Petroleum refining	EPR
- Employment total	E
- 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
- Labour supply, total	LR
Wage rates and productivity	
- Private, non-oil sector	WP
- Agriculture, forestry and fishing	WAG
- Other mining, quarrying	WMI
- Petrochemicals	WPS
- Other manufacturing	WMA
- Electricity, gas and water	WEW
- Construction	WCN
- Wholesale and retail trade	WTD
- Transport and communication	WTC
- Real estate	WRE
- Finance, insurance	WFI
- Community services	WCS
- Government sector	WG
- Crude oil and natural gas	WOG
- Petroleum refining	WPR
- Productivity, private non-oil sector	QP
- Productivity, government sector	QG
User cost of capital	
- Agriculture, forestry and fishing	PKAG
- Other mining, quarrying	PKMI
- Petrochemicals	PKPS
- Other manufacturing	PKMA

- Construction	PKCN
- Wholesale and retail trade	PKTD
- Transport and communication	PKTC
- Real estate	PKRE
- Finance, insurance	PKFI
- Community services	PKCS
- Crude oil and natural gas	PKOG
- Petroleum refining	PKPR
Real rate of return on capital by sector	
- Agriculture, forestry and fishing	IRAG
- Other mining, quarrying	IRMI
- Other manufacturing	IRMA
- Construction	IRCN
- Wholesale and retail trade	IRTD
- Transport and communication	IRTC
- Real estate	IRRE
- Finance, insurance	IRFI
- Community services	IRCS
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

Current account balance

- Current account balance	Z
- Net transfers and primary income	ZR

Residuals in I-O 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
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
Government balance	
- Governmnet, other revenues	RGROTH
- Government expenditure, chapter 1	RGECH12
- Government expenditure, chapter 3	RGECH3
- Government expenditure, chapter 4	RGECH4

Annex B. 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 consist 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 141 blocks, including 3 simultaneous blocks. The largest block has 111 equations and the next largest has 2.

Block	Size	Eqn	Var
1	1	243	WPS
2	1	194	KPS
3	2	149	YPS
		162	EPS
4	1	241	WAG
5	1	71	PYPS
6	1	242	WMI
7	1	233	IRMI
8	1	244	WMA
9	1	234	IRMA
10	1	247	WTD
11	1	236	IRTD
12	1	248	WTC
13	1	237	IRTC
14	1	235	IRCN
15	1	205	JOB
16	1	206	JOTM
17	1	253	WPR
18	1	208	JPR
19	1	204	KPR
20	2	159	YPR
		172	EPR
21	1	176	LR
22	1	177	E
23	1	252	WOG
24	1	171	EOG
25	1	251	WCS
26	1	240	IRCS
27	1	250	WFI
28	1	239	IRFI
29	1	249	WRE
30	1	238	IRRE
31	1	79	PYFGS
32	1	70	PYGS
33	1	75	PYBC
34	1	77	PYOG
35	1	76	PYPR
36	1	246	WCN
37	1	245	WEW

38	1	196	KEW
39	1	232	IRAG
40	111	1	VCPR
		2	CPRFOO
		3	PCPCLO
		4	PCPREN
		5	PCPFUR
		6	PCPMED
		7	PCPTRA
		8	PCPENT
		9	PCPOTH
		11	CPFOO
		12	CPRCLO
		13	CPRREN
		14	CPRFUR
		15	CPRMED
		16	CPRTRA
		17	CPRENT
		18	CPROTH
		19	CPRABR
		34	CPREN
		35	CPFUR
		36	CPCLO
		37	CPMED
		38	CPTRA
		39	CPENT
		40	CPOTH
		41	CPABR
		42	YRE
		43	YFI
		44	YCS
		45	XPS
		47	XOG
		48	XPR
		53	YGS
		63	PYFAG
		64	PYFMI
		65	PYFMA
		66	PYFCN
		67	PYFTD
		68	PYFTC
		69	PYCS
		72	PYFEW
		73	PYRE
		74	PYFI
		80	PCPFOO
		81	PYAG
		82	PYMI
		83	PYMA
		84	PYEW
		85	PYCN
		86	PYTD

87 PYTC
88 PCPABR
90 PJPH
91 PJPB
92 PJPTM
97 PJP
147 YAG
148 YMI
150 YMA
151 YEW
152 YCN
153 YTD
154 YTC
155 ERE
156 EFI
157 ECS
160 EAG
161 EMI
163 EMA
164 EEW
165 ECN
166 ETD
167 ETC
168 PYFRE
169 PYFFI
170 PYFCS
173 EP
174 YG
175 EG
179 KAG
180 KMI
182 KMA
183 KCN
184 KTD
185 KTC
186 KRE
187 KFI
188 KCS
192 JAG
193 JMI
195 JMA
197 JCN
198 JTD
199 JTC
200 JRE
201 JFI
202 JCS
209 JPH
210 JPB
211 JPTM
212 JP
216 VJP

		220	PKAG
		221	PKMI
		223	PKMA
		224	PKCN
		225	PKTD
		226	PKTC
		227	PKRE
		228	PKFI
		229	PKCS
41	1	10	CPR
42	1	104	PCPN
43	1	31	VCPN
44	1	20	VCP
45	1	21	CP
46	1	22	PCP
47	1	98	PCG
48	1	23	VCG
49	1	213	JG
50	1	214	JO
51	1	215	J
52	1	24	DA
53	1	25	X
54	1	100	PXOG
55	1	27	VXOG
56	1	101	PXPR
57	1	28	VXPR
58	1	102	PXPS
59	1	29	VXPS
60	1	103	PXX
61	1	30	VXX
62	1	26	VX
63	1	32	M
64	1	33	VM
65	1	46	YBC
66	1	49	YID
67	1	50	YP
68	1	51	VYP
69	1	52	YO
70	1	54	Y
71	1	55	VYG
72	1	56	VYID
73	1	118	VYOG
74	1	117	VYPR
75	1	57	VY
76	1	58	VYWP
77	1	59	VYWG
78	1	60	VYW
79	1	105	VYAG
80	1	119	VYTAG
81	1	106	VYMI
82	1	120	VYTMI
83	1	107	VYPS

84	1	121	VYTPS
85	1	108	VYMA
86	1	122	VYTMA
87	1	109	VYEW
88	1	123	VYTEW
89	1	110	VYCN
90	1	124	VYTCN
91	1	111	VYTD
92	1	125	VYTTD
93	1	112	VYTC
94	1	126	VYTTC
95	1	113	VYRE
96	1	127	VYTRE
97	1	114	VYFI
98	1	128	VYTFI
99	1	115	VYCS
100	1	129	VYTCS
101	1	116	VYBC
102	1	130	VYTBC
103	1	133	VYTP
104	1	135	VYSP
105	1	136	VYSH
106	1	61	HR
107	1	62	HW
108	1	78	PYP
109	1	89	PCPR
110	1	93	PJGB
111	1	94	PJGTM
112	1	95	PJOB
113	1	96	PJOTM
114	1	217	VJG
115	1	218	VJO
116	1	219	VJ
117	1	99	PDS
118	1	131	VYTPR
119	1	132	VYTOG
120	1	134	VYT
121	1	137	VYSC
122	1	138	VYSO
123	1	139	Z
124	1	140	GECH12
125	1	141	GECH3
126	1	142	GECH4
127	1	143	GROTH
128	1	144	GROIL
129	1	145	ZG
130	1	146	ZP
131	1	207	JOG
132	1	203	KOG
133	1	158	TFPOG
134	1	178	QP
135	1	181	PKPS

136	1	189	PKOG
137	1	190	PKPR
138	1	191	KP
139	1	222	IRPS
140	1	230	IROG
141	1	231	IRPR

Annex C. 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	21 22
CPABR	9 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPCLO	12 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPENT	17 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPFOO	11 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPFUR	14 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPMED	15 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPOTH	18 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPR	10 21 24 89
CPRABR	1 10 19
CPRCLO	1 3 10 12
CPREN	13 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
CPRENT	1 8 10 17
CPRFOO	1 2 10 11
CPRFUR	1 5 10 14
CPRMED	1 6 10 15
CPROTH	1 9 10 18
CPRREN	1 4 10 13
CPRTRA	1 7 10 16
CPTRA	16 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
DA	24
E	175 177
EAG	147 160 173
ECN	152 165 173
ECS	157 170 173
EEW	151 164 173
EFI	156 169 173
EG	59 174 175
EMA	150 163 173
EMI	148 161 173
EOG	158 171 175
EP	58 135 173 175 178
EPR	159 172 175
EPS	149 162 173
ERE	155 168 173
ETC	154 167 173
ETD	153 166 173
GECH12	140 145
GECH3	141 145
GECH4	142 145
GROIL	144 145
GROTH	143 145
HR	61 145
HW	62
IRAG	220 232
IRCN	224 235

IRCS 229 240
IRFI 228 239
IRMA 223 234
IRMI 221 233
IROG 230
IRPR 231
IRPS 222
IRRE 227 238
IRTC 226 237
IRTD 225 236
J 24 215
JAG 192 210 211
JCN 197 210 211
JCS 202 210 211
JFI 201 210 211
JG 213 215
JMA 195 210 211
JMI 193 210 211
JO 214 215
JOB 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 205 214 218
JOG 203 207
JOTM 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 206 214 218
JP 97 212 215
JPB 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 210 212 216
JPH 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 209 212 216
JPR 204 208
JPTM 32 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 211 212 216
JRE 200 209
JTC 199 210 211
JTD 198 210 211
KAG 147 179 191 192
KCN 152 183 191 197
KCS 157 188 191 202
KEW 151 191 196
KFI 156 187 191 201
KMA 150 182 191 195
KMI 148 180 191 193
KOG 158 189 203
KP 191
KPR 159 190 204
KPS 149 181 191 194
KRE 155 186 191 200
KTC 154 185 191 199
KTD 153 184 191 198
LR 176 177
M 32 33
PCG 23 98
PCP 22
PCPABR 1 2 3 4 5 6 7 8 9 88
PCPCLO 1 2 3 4 5 6 7 8 9 81 104
PCPENT 1 2 3 4 5 6 7 8 9 86
PCPFOO 1 2 3 4 5 6 7 8 9 80 104

PCPFUR	1 2 3 4 5 6 7 8 9 83 104
PCPMED	1 2 3 4 5 6 7 8 9 84
PCPN	31 104
PCPOTH	1 2 3 4 5 6 7 8 9 87 104
PCPR	89
PCPREN	1 2 3 4 5 6 7 8 9 82
PCPTRA	1 2 3 4 5 6 7 8 9 85 104
PDS	99
PJGB	93 217
PJGTM	94 217
PJOB	95 218
PJOTM	96 218
PJP	97 220 221 222 223 224 225 226 227 228 229 230 231
PJPB	91 216
PJPH	90 216
PJPTM	92 216
PKAG	179 220
PKCN	183 224
PKCS	188 229
PKFI	187 228
PKMA	182 223
PKMI	180 221
PKOG	189 230
PKPR	190 231
PKPS	181 222
PKRE	186 227
PKTC	185 226
PKTD	184 225
PXOG	27 100
PXPR	28 101
PXPS	29 102
PXX	30 103
PYAG	51 63 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 105
PYBC	51 75 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 116
PYCN	51 66 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 110
PYCS	51 69 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 115
PYEW	51 72 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 109
PYFAG	63 119 160 179
PYFCN	66 124 165 183
PYFCS	69 129 170 188
PYFEW	72 123 164
PYFFI	74 128 169 187
PYFGS	70 79
PYFI	51 74 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 96 98 100 101 102 103 114
PYFMA	65 122 163 182
PYFMI	64 120 161 180

Annex D. Examples on simulating the model[6]

Introduction

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.

[6] This example is taken from the Implementation Model, but the Selection Model is operated in the same way. The main different is the length of some (a few) of the time series. Some of the time series are available only for the base year, implying that a «historical» simulation is only possible for this year.

The simulate command initiates a simultaneous simulation of the working model. The models incidence matrix and its block structure are analysed 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.

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, analyse 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.

```
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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
```

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

```
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Copyright (C) Massachusetts Institute of Technology 1978-1987

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
```

earlier. We may do this because the correct access and search will be given from inside the program REFSIM.

Next we compile the program REFSIM[7], 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.

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 ALT1REF1[8], 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.

---

[7] 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.
[8] This file should be given a new name if another alterative scenario (policy) is to be made.

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.

```
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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
```

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ISSN 0805-9411

Statistics Norway